Chemistry

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CHEMISTRY AT A GLANCE

ESPECIAL QUESTION BANK FOR PRACTICE

(NEET)

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Contents

CHEMISTRY AT A GLANCE

PHYSICAL CHEMISTRY

MOLE CONCEPT

1. Number of moles of neutrons in 1.8 mL of water is :-
(1) 4.8×10^{23} (2) 4.8×10^{24}
(3) 0.8 (4) 0.1

2. The weight of 350 mL of a diatomic gas at 0°C and 2atm pressure is 1gm. The weight of one atom is :-
(1) $\frac{16}{N_A}$ (2) $\frac{32}{N_A}$ (3) $16\ N_A$ (4) $32\ N_A$

3. 10 mL of gaseous hydrocarbon on combustion gives 20mL of CO_2 and 30mL of $H_2O(g)$. The hydrocarbon is :-
(1) C_4H_{10} (2) C_2H_6 (3) C_3H_8 (4) C_5H_{10}

4. For the reaction $A + 2B \rightarrow C$, 5 moles of A and 8 moles of B will produce :-
(1) 5 moles of C (2) 4 moles of C
(3) 8 moles of C (4) 13 moles of C

5. If the atomic weight of carbon is set at 24 amu, the value of the avogadro constant would be :-
(1) 6.022×10^{23} (2) 12.044×10^{23}
(3) 3.011×10^{23} (4) none of these

6. Boron has two isotopes, B-10 and B-11. The average atomic mass of Boron is found to be 10.80 u. Calculate the percentage abundance of isotopes :-
(1) 80 (2) 20 (3) 25 (4) 75

7. A compound on analysis gave the following results C = 54.54%, H = 9.09% and vapour density of compound = 88. Determine the molecular formula of the compound:-
(1) $C_8H_{16}O_4$ (2) $C_4H_{16}O_8$
(3) C_2H_4O (4) CH_4O_2

8. Two elements X and Y (atomic mass of X = 75 and Y = 16) combine to give a compound having 76% of X. The formula of compound is :-
(1) XY (2) X_2Y (3) X_2Y_3 (4) X_2Y_3

9. Mass of CO_2 produced on heating 20g of 40% pure limestone :-
(1) 8 gm (2) 8.8 gm
(3) 3.52 gm (4) none of these

10. Calculate the amount of 50% H_2SO_4 required to decompose 25g of calcium carbonate :-
(1) 98 gm (2) 49 gm
(3) 24.5 gm (4) 196 gm

11. 8gm H, 32 gm O_2 is allowed to react to form water then which of the following statement is correct ?
(1) O_2 is limiting reagent
(2) O_2 is reagent in excess
(3) H_2 is limiting reagent
(4) 40 g water is formed

12. A compound contain 34% of sulphur, the minimum molecular wt of compound is :-
(1) 941.76 (2) 944
(3) 945.27 (4) None

13. The maximum number of molecules is present in :-
(1) 15 L H_2 gas at STP
(2) 5 L of N_2 gas at STP
(3) 0.5 g H_2 gas
(4) 10g of O_2 gas

14. If the weight of metal chloride is x gm containing y gm of metal, the equivalent weight of metal will be :-
(1) $\frac{x}{y} \times 35.5$ (2) $\frac{8(y-x)}{x}$
(3) $\frac{y}{x-y} \times 35.5$ (4) $E = \frac{8(x-y)}{y}$

15. Equal masses of H_2, N_2 and methane taken in a container of volume V at temperature 27°C in identical conditions. The ratio of volumes of gases H_2, N_2 : methane would be :-
(1) 56 : 4 : 7 (2) 7 : 4 : 56
(3) 2 : 28 : 16 (4) 8 : 14 : 1

16. For the formation of 3.65 g of HCl gas, what volume of hydrogen gas and chlorine gas are required at NTP conditions ?
(1) 1L, 1L (2) 1.12 L, 2.24 L
(3) 3.65 L, 1.83 L (4) 1.12L, 1.12 L

17. Which of the following has the highest mass ?
(1) 1 g-atom of C
(2) $\frac{1}{2}$ mole of CH_4
(3) 10 mL of water
(4) 3.011×10^{23} atoms of oxygen

18. For the complete combustion of 4 litres of CO at NTP, the required volume of O_2 at NTP is :-
(1) 4 litres (2) 8 litres
(3) 2 litres (4) 1 litre

PHYSICAL CHEMISTRY

MOLE CONCEPT

1. Number of moles of neutrons in 1.8 mL of water is :-
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(1) 1 g-atom of C
(2) $\frac{1}{2}$ mole of CH_4
(3) 10 mL of water
(4) 3.011×10^{23} atoms of oxygen

18. For the complete combustion of 4 litres of CO at NTP, the required volume of O_2 at NTP is :-
(1) 4 litres (2) 8 litres
(3) 2 litres (4) 1 litre

19. A gas is found to have molecular formula $(CO)_x$. Its vapour density is 70, the value of x must be :-
(1) 7 (2) 4 (3) 5 (4) 6

20. 1 litre of a hydrocarbon weight as much as one litre of CO_2. The molecular formula of hydrocarbon is :-
(1) C_2H_4 (2) C_3H_8 (3) C_2H_6 (4) C_3H_6

21. Four one litre flasks are separately filled with the gases hydrogen, helium, oxygen and ozone at same room temperature and in the different flasks the ratio of total atoms would be :-
(1) 1 : 1 : 1 : 1 (2) 1 : 2 : 2 : 3
(3) 2 : 1 : 2 : 3 (4) 2 : 1 : 3 : 2

22. There are two oxides of sulphur. They contain 50% and 60% of oxygen respective by weights. The weights of sulphur which combine with 1 gm of oxygen in the ratio g :-
(1) 1 : 1 (2) 2 : 1
(3) 2 : 3 (4) 3 : 2

23. A gas is found to contain 2.34 gm of nitrogen and 5.34 gm of oxygen simplest formula of the compound is :-
(1) N_2O (2) NO
(3) N_2O_3 (4) NO_2

24. 16 cc of CO_2 are passed over red hot coke. The volume of CO evolved is :-
(1) 18 cc (2) 32 cc (3) 16 cc (4) 4 cc

25. 500 ml of a gaseous hydrocarbon when burnt in excess of O_2 gave 2.0 litres of CO_2 and 2.5 litres of water vapours under same conditions. molecular formula of the hydrocarbon is :-
(1) C_4H_8 (2) C_4H_{10} (3) C_5H_{10} (4) C_5H_{12}

26. The total number of ions present in 1 ml of 0.1 M barium nitrate solution is :-
(1) 6.02×10^{18} (2) 6.02×10^{19}
(3) $3.0 \times 6.02 \times 10^{19}$ (4) $3.0 \times 6.02 \times 10^{22}$

27. One gm equivalent of substance present in :-
(1) 0.25 mole O_2 (2) 0.5 mole of O_2
(3) 1.00 mole of O_2 (4) 8.00 mole of O_2

28. In a compound A_xB_y :-
(1) Mole of A = mole of B = mole of A_xB_y
(2) eq of A = eq of B = eq of A_xB_y
(3) yx mole of A = yx mole of B = (x + y) mole of A_xB_y
(4) yx mole of A = yx mole of B

29. How many moles of magnesium phosphate $Mg_3(PO_4)_2$ will contain 0.25 mole of oxygen atoms?
(1) 2.5×10^{-1} (2) 0.02
(3) 3.125×10^{-2} (4) 1.25×10^{-2}

30. 10 g of MnO_2 on reaction with HCl forms 2.24 L of $Cl_2(g)$ at NTP, the percentage impurity of MnO_2 is :-
$MnO_2 + 4HCl \rightarrow MnCl_2 + Cl_2 + 2H_2O$
(1) 87% (2) 25% (3) 33.3% (4) 13 %

31. The number of H-atoms present in 5.6 gram are
(1) 6.02×10^{23} (2) 2.24×10^{23}
(3) 2.24×10^{22} (4) 3.1×10^{22}

32. How many moles of methane are required to produce 22 g of $CO_2(g)$ after combustion
$CH_4(g) + 2O_2(g) \rightarrow CO_2(g) + 2H_2O(g)$
(1) 1 mol (2) 0.5 mol
(3) 0.25 mol (4) 1.25 mol

33. In a 5.2 molal aqueous solution of methyl alcohol What will be the mole fraction of methyl alcohol?
(1) 0.190 (2) 0.086 (3) 0.050 (4) 0.100

34. The isotpic abudance of C-12 and C-14 is 98% and 2% respectively. What would be the number of atoms of C-14 isotope in 12 g carbon sample
(1) 1.032×10^{22} (2) 3.01×10^{23}
(3) 5.88×10^{21} (4) 6.02×10^{23}

35. The volume of air needed for complete combustion of 1 kg carbon at STP is
(1) 9333.33 litre (2) 933.33 litre
(3) 93.33 lure (4) 1866.67 litre

36. A compound made of two elements A and B is found to contains 25% A (atomic mass 12.5) and 75% B (atomic mass 37.5). The simplest formula of the the compound is
(1) AB (2) A_2B_2 (3) AB_3 (4) A_3B

37. $CaCO_3 + 2HCl \rightarrow CaCl_2 + CO_2 + H_2O$
what will be the amount of $CaCl_2$ when 10g $CaCO_3$ and 200 mL 0.75 M HCl is used in the reaction?
(1) 83.25 g (2) 16.65 g
(3) 11.1 g (4) 8.325 g

38. A compound is analyzed and found to consist of 50.4% Ce, 15.1 % N and 34.5% O by mass. What is the correct formula for the compound? (Atomic wt. of Ce = 140)
(1) $Ce_2(NO_3)_2$ (2) $Ce_2(NO_3)_3$
(3) $Ce(NO_3)_2$ (4) $Ce(NO_3)_3$

39. What is the mass of oxygen that is required for the complete combustion of 2.8 kg ethylene
(1) 2.8 kg (2) 6.4 kg (3) 96 kg (4) 9.6 kg

40. The density of water is 1gm/ml what is the volume occupied by 1 molecule of water in mL
(1) 3×10^{-23} (2) 1×10^{-23}
(2) 2×10^{-23} (4) 4×10^{-23}

ATOMIC STRUCTURE

41. FM radio broadcasts at 900 KHz. What wavelength does this corresponds to ?
(1) 333 m (2) 3.03×10^{-3}m
(3) 330 cm (4) d 3300 m

42. Energy of 1 mole of radio wave photons with a frequency of 909 KHz is :-
(1) 6.02×10^{-28}J (2) 3.62×10^{-4}J
(3) 1.00×10^{-4}J (4) 6.02×10^{-3} J

43. The wavelength of a neutron with a translatory kinetic energy equal to KT at 300 K is :-
(1) 178 pm (2) 200 pm
(3) 17.8 pm (4) 20.0 pm

44. Frequency of a matter wave its equal to :-
(1) $\frac{(KE)}{2h}$ (2) $\frac{2(KE)}{h}$ (3) $\frac{(KE)}{h}$ (4) λ

45. Ionisation energy of He$^+$ is 19.6×10^{-18} J atom^{-1}. The energy of first stationary state (n =1) of Li^{+2} is :-
(1) 4.41×10^{-18} J atom^{-1}
(2) -4.41×10^{-17} J atom^{-1}
(3) -2.20×10^{-15} J atom^{-1}
(4) 8.82×10^{-17} J atom^{-1}

46. Kinetic energy of an electron in the second bohr orbit of a hydrogen atom is (a_0 is bohr radius):-
(1) $\frac{h^2}{4\pi m a_0^2}$ (2) $\frac{h^2}{16\pi^2 m a_0^2}$
(3) $\frac{h^2}{32\pi^2 m a_0^2}$ (4) $\frac{h^2}{64\pi^2 m a_0^2}$

47. The potential energy of an electron in the second Bohr's orbit of the He$^+$ ion is :-
(1) -54.4 eV (2) -27.2 eV
(3) -108.8 eV (4) -13.6 eV

48. If the radius of the first bohr orbit is X, the de broglie wavelegnth of the electron in the third orbit is nearly...-
(1) $2\pi X$ (2) $6\pi X$ (3) 9X (4) X/3

49. According to Bohr's theory, the angular momentum of an electron in 5th orbit is :-
(1) $25\frac{h}{\pi}$ (2) $1.0\frac{h}{\pi}$ (3) $10\frac{h}{\pi}$ (4) $2.5\frac{h}{\pi}$

50. The number of d electrons retained in Fe^{3+} (atomic number Fe = 26) ion is :-
(1) 3 (2) 4 (3) 5 (4) 6

51. Which of the following nuclear reactions will generate an isotope ?
(1) Neutron particle emission
(2) Positron emission
(3) α particle emission
(4) β particle emission

52. The wavelength (in nanometer) associated with a proton (mass = 1.67×10^{-27} kg atom^{-1}) at the velocity of 1.0×10^3 ms^{-1} is :-
(1) 6.032 nm (2) 0.400 nm
(3) 2.500 nm (4) 4.00 nm

53. How many orbitals are possible for n = 3, l = 2 ?
(1) 1 (2) 3 (3) 5 (4) 7

54. Which of the following is violating hund's rule :-
(1) [1] [1↓ 1] [1]
(2) [1↓] [1↓] [1↓ | |]
(3) [1↓] [1 | ↓ | ↓]
(4) All

55. In hydrogen atom, the energy of second shell $e^{\ominus}$ is :-
(1) -5.44×10^{-19} J (2) -5.44×10^{-19} KJ
(3) -5.44×10^{-19} Cal (4) -5.44×10^{-19} erg

56. 0.5 gm particle has uncertainity of 2×10^{-5} m find the uncertainty in
(1) 3.0×10^{33} (2) 5×10^{-27}
(3) 4×10^{-30} (4) 4×10^{-19}

57. Which of the following has similar spectrum as that of Li^{+2} :-
(1) H (2) Na^{+10}
(3) He (4) He^+

58. Radius of first bohr's orbit of hydrogen atom is 0.53 A then the radius of 3rd bohr orbit is :-
(1) 0.70 A (2) 1.59 A
(3) 3.18 A (4) 4.77 A

59. If n=3 then ℓ has correct value :-
(1) 0 (2) 1
(3) 2 (4) All of the above

60. What will be the ratio of de-Broglie wave length of e⁻ accelerated with 400 volt and 100 volt :-
(1) 1 : 2 (2) 2 : 1
(3) 3 : 10 (4) 10 : 3

61. In an atom 2K, 8L, 8M, 2N electrons are present. If m = 0, s = 1/2, then find no. of e⁻ :-
(1) 6 (2) 2 (3) 8 (4) 16

62. Which of following has maximum possibility to find e⁻ in d_{xy} orbital :-
(1) Along x axis
(2) Along z axis
(3) Along zx plane 2D
(4) At an angle of 45° from z & x axis

63. In bohr's model $\frac{nh}{2\pi}$ shows :-
(1) Momentum (2) Kinetic energy
(3) Potential energy (4) Angular momentum

64. $2P_y$ orbital electron has energy :-
(1) more than 2Px orbital
(2) more than 2Pz orbital
(3) same as 2Px and 2Pz
(4) same as of 2s orbital

65. Angular momentum of orbital of d electron is:-
(1) $\sqrt{\frac{3}{2}}\frac{h}{\pi}$ (2) $\sqrt{6}\frac{h}{2\pi}$
(3) $\frac{h}{\sqrt{2}\pi}$ (4) $\frac{\sqrt{3}h}{2\pi}$

66. Which has lowest wavelength :-
(1) Balmer series (2) Bracket series
(3) Humphry series (4) Lymen series

67. Which of the following ion has magnetic moment is 3.87 BM:-
(1) Ti^{3+} (2) Sc^{+} (3) Ti^{+} (4) Mn^{+5}

68. No of e⁻ in 2d orbital are :-
(1) 10 (2) 5 (3) 2 (4) zero

69. Which of the following value of quantum is not possible for 4f:-
(1) n = 4 (2) ℓ = 2
(3) m = −2 to +2 (4) all are possible

70. No of spectral line obtained when electron is provided an energy of 11 ev :-
(1) 1 (2) 2
(3) 3 (4) 6

71. Which of the following sets of quantum number is not possible
(1) n=3, ℓ=+2, m_ℓ = 0, m_s = +1/2
(2) n=1, ℓ=0, m_ℓ=0, m_s=−1/2
(3) n=3, ℓ=0, m_ℓ=−1, m_s = +1/2
(4) n=3, ℓ=1, m_ℓ=0, m_s = + 1/2

72. The number of radial nodes in 3s and 2_p subshells respectively are
(1) 2 and 0 (2) 1 and 2
(3) 0 and 2 (4) 2 and 1

73. The mass of an electron is 9.1×10^{-31} kg and velocity is 2.99×10^{8} cm s^{-1}. The wavelength of the electron will be
(1) 0.243 Å (2) 0.0243 Å
(3) 4.21 Å (4) 0.421Å

74. For sodium atom number of electrons with m = 0 will be
(1) 2 (2) 7 (3) 9 (4) 8

75. How many electrons in an atom can have n=3, ℓ=1, m=−1 and s = +½
(1) 1 (2) 2 (3) 4 (4) 6

76. Arrange the following wavelengths (λ) of given amission lines of H atoms in increasing order
(a) $n=3 \xrightarrow{\lambda_1} n=1$ (b) $n=12 \xrightarrow{\lambda_2} n=10$
(c) $n=5 \xrightarrow{\lambda_3} n=3$ (d) $n=22 \xrightarrow{\lambda_4} n=20$
Choose the correct option.
(1) $\lambda_4 < \lambda_2 < \lambda_3 < \lambda_1$ (2) $\lambda_4 < \lambda_2 < \lambda_3 < \lambda_1$
(3) $\lambda_1 < \lambda_2 < \lambda_3 < \lambda_4$ (4) $\lambda_1 < \lambda_3 < \lambda_2 < \lambda_4$

77. If ionisation potential of hydrogen atom is 13.6 eV, then ionisation potential of He^{+} will be
(1) 54.4 eV (2) 6.8 eV
(3) 13.6 eV (4) 24.5 eV

78. For which of the following sets of quantum numbes of an electron will have the highest energy?

	n	ℓ	m	s
(1)	3	2	1	−½
(2)	4	1	−1	+½
(3)	4	3	−1	+½
(4)	5	0	0	−½

CHEMICAL EQUILIBRIUM

79. By dissociation of 4g mol of PCl_5 produce 0.8 mol of PCl_3 if vol of container is 1 ltr the equilibrium constant :-
(1) 0.2 (2) 0.1
(3) 0.4 (4) 1

80. In a system $P_{(s)} \rightleftharpoons 2Q_{(g)} + R_{(g)}$ at equilibrium is concentration of 'Q' is doubled than how many times the concentration of R at equilibrium will be :-
(1) Double of its original concentration
(2) $\frac{1}{4}$ of its original concentration
(3) $\frac{1}{2}$ of its original concentration
(4) 4 times of its original concentration

81. 1 mol of $XY_{(g)}$ and 0.2 mol of $Y_{(g)}$ are mixed in 1L vessel. At equilibrium 0.6 mol of $Y_{(g)}$ is present. The value of K for the reaction :-
$XY(g) \rightleftharpoons X(g) + Y(g)$ is
(1) 0.04 (2) 0.06 (3) 0.36 (4) 0.40

82. In which of the following reaction is almost completed :-
(1) $K = 10$ (2) $K = 1$
(3) $K = 10^3$ (4) $K = 10^{-2}$

83. If the concentration of Y^- ion in the reaction
$XY_{3(s)} \rightleftharpoons X^{+3}_{(aq)} + 3Y^-_{(aq)}$ is
decreased by $\frac{1}{2}$ times, then equilibrium conc^n of X^{+3} will increase by :-
(1) 2 times (2) 4 times
(3) 8 times (4) 16 times

84. Given the reaction b/w 3 gases represented X_2, Y_2, Z_2 to give the compound $XYZ_{(g)}$
$X_{2(g)} + Y_{2(g)} + Z_{2(g)} \rightleftharpoons 2XYZ_{(g)}$
At equilibrium conc^n of $X_2 = 3M$, $Y_2 = 6M$, $Z_2 = 9M$
$XYZ = 6M$
If the reaction take place in a sealed vessel at 527°C, then the value of K_C will be :
(1) $\frac{27}{2}$ (2) $\frac{2}{9}$ (3) 36 (4) 24

85. A gaseous mixture was prepared by taking 3 mol of H_2 and 1 mol of CO. If the total pressure of the mixture was found 2 atmosphere then partial pressure of hydrogen (H_2) in the mixture is :-
(1) $\frac{3}{2}$ (2) $\frac{1}{2}$ (3) 1 (4) 2

86. The value of K_c at 800 K temp for following reaction is 5
$N_{2(g)} + O_{2(g)} \rightleftharpoons 2NO_{(g)}$ If equilibrium conc^n of N_2 and O_2 is 0.5M then value of K_p is :-
(1) 0.02 (2) 0.2
(3) 5 (4) $\frac{5}{RT}$

87. The equilibrium constant K_c for the following reaction at 842°C is 7.90×10^{-1}. What is K_p at same temperature ?
$$\frac{1}{2}F_{2(g)} \rightleftharpoons F_{(g)}$$
(1) 8.64×10^{-5} (2) 8.26×10^{-4}
(3) 7.90×10^{-2} (4) 7.56×10^{-2}

88. $NH_4HS_{(s)} \rightleftharpoons NH_{3(g)} + H_2S_{(g)}$
The equilibrium pressure at 25°C is 0.660 atm. What is K_p for reaction ?
$NH_4NH_{(s)} \rightleftharpoons NH_{3(g)} + H_2S_{(g)}$
(1) 0.109 (2) 0.218
(3) 1.89 (4) 2.18

89. At a certain temperature only 50% HI dissociated at equilibrium in the following reaction
$2HI_{(g)} \rightleftharpoons H_{2(g)} + I_{2(g)}$
The equilibrium constant for reaction
(1) 0.25 (2) 1.0 (3) 3.0 (4) 0.5

90. For the reaction $CO_{(g)} + Cl_{2(g)} \rightleftharpoons COCl_{2(g)}$ the value of $\frac{K_C}{K_P}$ is equal to :-
(1) $\sqrt{RT}$ (2) RT (3) $\frac{1}{RT}$ (4) 1

91. The equilibrium constant (K_c) for the reaction
$2HCl_{(g)} \rightleftharpoons H_{2(g)} + Cl_{2(g)}$
is 2×10^{-3} at 25°C. What is the equilibrium constant for the reaction $H_{2(g)} + Cl_{2(g)} \rightleftharpoons 2HCl_{(g)}$:-
(1) 2×10^{-3} (2) 50
(3) 5×10^2 (4) None of these

92. If K_1 and K_2 are the equilibrium constant for the two reactions
$XeF_{4(g)} + H_2O_{(g)} \rightleftharpoons XeOF_{4(g)} + 2HF_{(g)}$
$XeO_{4(g)} + XeF_{6(g)} \rightleftharpoons XeOF_{4(g)} + XeO_3F_{2(g)}$
The equilibrium constant for the reaction
$XeO_{4(g)} + 2HF_{(g)} \rightleftharpoons XeO_3F_{2(g)} + H_2O_{(g)}$ is
(1) K_1K_2 (2) K_1/K_2^2
(3) K_2/K_1 (4) K_1/K_2

93. For which reaction K_p is less than K_c :-
(1) $N_2O_4 \rightleftharpoons 2NO_2$
(2) $2HI \rightleftharpoons H_2+F_2$
(3) $2SO_2 + O_2 \rightleftharpoons 2SO_3$
(4) $N_2+O_2 \rightleftharpoons 2NO$

94. At 25°C the equilibrium constant K_1 and K_2 of two reaction are
$2NH_3 \rightleftharpoons N_2+3H_2$: K_1
$\frac{1}{2}N_2 + \frac{3}{2}H_2 \rightleftharpoons NH_3$: K_2
The relation b/w two equilibrium constant is
(1) $K_1 = K_2$ (2) $K_1 = \frac{1}{K_2^2}$
(3) $K_1 = \frac{1}{K_2^2}$ (4) $K_1 = \frac{1}{K_2}$

95. For the reaction $2SO_3(g) \rightleftharpoons 2SO_{2(g)} + O_{2(g)}$ the value of $\frac{K_c}{K_p}$ will be :-
(1) $(RT)^1$ (2) $(RT)^{-1}$ (3) $\sqrt{RT}$ (4) $(RT)^{-2}$

96. For $N_2+3H_2 \rightleftharpoons 2NH_3$; ΔH = -ve then :-
(1) $K_p = K_c$
(2) $K_p = K_c RT$
(3) $K_p = K_c (RT)^{-2}$
(4) $K_p = K_c (RT)^{-1}$

97. Consider the reaction :-
$2CO(g) + 2H_2O_{(g)} \rightleftharpoons 2CO_{2(g)} + 2H_{2(g)}$ eq. const = K_1
$CH_{4(g)} + H_2O_{(g)} \rightleftharpoons CO_{(g)} + 3H_{2(g)}$; eq. const = K_2
$CH_{4(g)} + 2H_2O_{(g)} \rightleftharpoons CO_{2(g)} + 4H_{2(g)}$; eq. const = K_3
Which of the following relation is correct ?
(1) $K_3 = \frac{K_1}{K_2}$ (2) $K_3 = \frac{K_2^2}{K_1^2}$
(3) $K_3 = K_1K_2$ (4) $K_3 = \sqrt{K_1} \cdot K_2$

98. One mole of X_2 is mixed with one mole of Y_2 in a flask of volume 1 litre. If at equilibrium 0.5 mole of Y_2 are obtained. Then find out K_c for reaction
$X_{2(g)} + Y_{2(g)} \rightleftharpoons 2XY_{(g)}$
(1) 12 (2) 9 (3) 4 (4) 36

99. For the reaction $2NO_{2(g)} + \frac{1}{2}O_2 \rightleftharpoons N_2O_{5(g)}$ if the equilibrium constant is K_p, then the equilibrium constant for the reaction $2N_2O_{5(g)} \rightleftharpoons 4NO_{2(g)} + O_{2(g)}$ would be :-
(1) K_p^2 (2) $\frac{2}{K_p}$ (3) $\frac{1}{K_p^2}$ (4) $\frac{1}{\sqrt{K_p}}$

100. In the rxn $X_{(g)} + Y_{(g)} \rightleftharpoons 2Z_{(g)}$
2 mol of X, 1 mol of Y and 1 mol of Z are placed in a 10 litre vessel and allowed to reach equilibrium. If final conc^n of Z is 0.2M, then K_c for the given reaction is :-
(1) 1.6 (2) 80/3
(3) 16/3 (4) None of these

101. For the reversible reaction
$PCl_{5(g)} + Cl_{2(g)} \rightleftharpoons PCl_{3(g)}$ + heat
The equilibrium will shift in forward direction
(1) By increasing conc of $PCl_{5(g)}$
(2) By decreasing pressure
(3) By decreasing conc^n of $PCl_{3(g)}$ and $Cl_{2(g)}$
(4) By increasing pressure and decreasing temp.

102. For a given endothermic rxn, K_p and K_p' are the equilibrium constant at temp T_1 and T_2 respectively. Assuming the heat of reaction is constant in temp. range b/w T_1 and T_2, it is readily observed that $T_2 > T_1$:-
(1) $K_p > K_p'$ (2) $K_p < K_p'$
(3) $K_p = K_p'$ (4) $K_p = \frac{1}{K_p'}$

103. Which reaction give more product as a result of increase in pressure :-
(1) $H_2O + CO \rightleftharpoons H_2 + CO_2$
(2) $H_2 + Br_2 \rightleftharpoons 2HBr$
(3) $2SO_2 + O_2 \rightleftharpoons 2SO_3$
(4) $2HI \rightleftharpoons H_2+I_2$

104. The equilibrium constant for the following reaction is 10 at 500 K. A system at equilibrium has [CO] = 0.25 M and [H_2] 1M. What is the [CH_3OH] ?

$$CO_{(g)} + 2H_{2(g)} \rightleftharpoons CH_3OH_{(g)}$$

(1) 0.25 (2) 2.5 (3) 5 (4) 10

105. At certain temp. compound $AB_{2(g)}$ dissociate according to reaction $AB_{2(g)} \rightleftharpoons AB_{(g)} + B_{(g)}$ with degree of dissociation α, which is small compared with unity. The expression of K_p in terms of α and initial pressure P is :-

(1) $P\alpha^3$ (2) $P\alpha^2$

(3) $\frac{\alpha^3}{P}$ (4) $\frac{\alpha^2}{P}$

106. For which of the following reaction is product formation favoured by low pressure and high temperature

(1) $H_{2(g)} + I_{2(g)} \rightleftharpoons 2HI_{(g)}$ $\Delta H^\circ = -9.4KJ$
(2) $CO_{2(g)} + C_{(s)} \rightleftharpoons 2CO_{(g)}$ $\Delta H^\circ = 172.5KJ$
(3) $CO_{(g)} + 2H_{2(g)} \rightleftharpoons CH_3OH_{(g)}$ $\Delta H^\circ = -21.7KJ$
(4) $2SO_{2(g)} + O_{2(g)} \rightleftharpoons 2SO_{3(g)}$ $\Delta H^\circ = 285$ KJ

107. For which reaction $K_p = K_C$:-

(1) $N_{2(g)} + 3H_{2(g)} \rightleftharpoons 2NH_{3(g)}$
(2) $2NOCl_{(g)} \rightleftharpoons 2NO_{(g)} + Cl_{2(g)}$
(3) $I_{2(g)} + H_{2(g)} \rightleftharpoons 2HI_{(g)}$
(4) None of these

108. For the reaction

$$CO(g) + H_2O(g) \rightleftharpoons CO_2(g) + H_2(g)$$

at a given temperature the equilibrium amount of $CO_2(g)$ can be increased by

(1) adding suitable catalyst
(2) adding inert gas
(3) decreasing the volume of container
(4) increasing the amount of CO(g)

109. The equilibrium constant for the reaction $N_2(g) + O_2(g) \rightleftharpoons 2NO(g)$ is 4×10^{-4} at 200 K. In presence of a catalyst equilibrium is attained ten times faster. Therefore, the equilibrium constant in presence of the catalyst at 200 K is

(1) 40×40^4
(2) 4×10^{-4}
(3) 4×10^{-3}
(4) difficult to compute without more data

110. $NH_2COONH_4(s) \rightleftharpoons 2NH_3(g) + CO_2(g)$
If equilibrium pressure is 3 atm for the above reaction K_p will be

(1) 4 (2) 27 (3) 4/27 (4) 1/27

111. 1 mole of H_2 and 2 mole of I_2 are taken initially in a 2L vessel. The number of moles of H_2 at equilibrium is 0.2 then, the number of moles of I_2 and HI at equilibrium are

(1) 1.2, 1.6 (2) 1.8, 1.0
(3) 0.4, 2.4 (4) 0.8, 2.0

112. In a vessel of 5L, 26 moles of A and 4 moles of B were placed. At equilibrium 1 mole of C was present. The K_c for the reaction : $A + 2B \rightleftharpoons C$ is

(1) 0.25 (2) 0.50 (3) 2.5 (4) 4.8

113. Consider the following gaseous equilibrium with equilibrium constant K_1 and K_2, respectively

$$SO_2(g) + \tfrac{1}{2} O_2(g) \rightleftharpoons SO_3(g)$$
$$2SO_3(g) \rightleftharpoons 2SO_2(g) + O_2(g)$$

The equilibrium constants are related as

(1) $2K_1 = K_2^2$ (2) $K_1^2 = \frac{1}{K_2}$

(3) $K_2^2 = \frac{1}{K_1}$ (4) $K_2 = \frac{2}{K_1^2}$

114. Out of the following one which is correct for equilibrium state?

(a) $\Delta G = 0$ (b) $\Delta S = 0$ (c) $r_f = r_b$ (d) $E_{cell} = 0$

(1) a,b (2) only b (3) a,c & d (4) only c

115. For a reaction $SO_{2(g)} + \frac{1}{2}O_{2(g)} \rightleftharpoons SO_{3(g)}$

The value of $\frac{K_p}{K_c}$ is equal to

(1) 1 (2) RT (3) $(RT)^{1/2}$ (4) $(RT)^{1/2}$

116. For the reaction $N_2O_{4(g)} \rightleftharpoons 2NO_{2(g)}$ the degree of dissociation is 0.2 at equilibrium and 1 atm pressure then equilibrium constant K_p will be

(1) $\frac{1}{2}$ (2) $\frac{1}{4}$ (3) $\frac{1}{6}$ (4) $\frac{1}{8}$

117. One mole of X and Y are allowed to react in a 2L container when equilibrium is reached the following reaction occurs $2X + Y \rightleftharpoons Z$. If the concentration of Z is 0.2M calculate the equilibrium constant for this reaction

(1) 0.015 (2) 2.22
(3) 6.70 (4) 66.7

118. 28g N and 6g H_2 were mixed. At equilibrium 17g NH_3 was formed. The mass of N_2 and H_2 at equilibrium are respectively
(1) 11g, zero (2) 1g, 3g
(3) 14g, 3g (4) 11g, 3g

119. For the reaction $H_2(g) + I_2(g) \rightleftharpoons 2HI(g)$ the equilibrium constant will change with
(1) total pressure
(2) catalyst
(3) concentration of H_2 and I_2
(4) temperature

IONIC EQUILIBRIUM

120 What is the K_b of weak base that produce one OH^- ion if a 0.05 M solution is 2.5% ionised ?
(1) 7.8×10^{-6} (2) 1.6×10^{-6}
(3) 3.1×10^{-5} (4) 1.2×10^{-3}

121 Solubility of calcium phosphate (molecular mass, M) in water is w g per 100 ml at 25°C its solubility product at 25°C will be approximately
(1) $10^2\left(\frac{w}{M}\right)^5$ (2) $0\left(\frac{w}{M}\right)^5$
(3) $10^2\left(\frac{w}{M}\right)^5$ (4) $10^3\left(\frac{w}{M}\right)^5$

122 0.2 gm sample of benzoic acid C_6H_5COOH is titrated with 0.12 M $Ba(OH)_2$ solution, what volume of $Ba(OH)_2$ solution is required to reach the equivalent point ?
(1) 6.83 ml (2) 13.6 ml
(3) 17.6 ml (4) 35.2 ml

123 The Ksp of Ag_2CrO_4 is 1.1×10^{-12} at 298 K solubility in (mole/L) of Ag_2CrO_4 in 0.1M $AgNO_3$ solution is
(1) 1.1×10^{-11} (2) 1.1×10^{-6}
(3) 1.1×10^{-7} (4) 1.1×10^{-5}

124 For a sparingly soluble salt A_pB_q the relation of its solubility product (L) with its solubility (S) is
(1) $L_{A_pB_q} = S^{(p+q)} p^p q^q$ (2) $L_{A_pB_q} = S^{(p+q)} p^q q^p$
(3) $L_{A_pB_q} = S^{(p+q)} p^p q^q$ (4) $L_{A_pB_q} = S^{(p+q)} (pq)^{pq}$

125 The degree of dissociation of water at 25°C is 1.9×10^{-9} % and density 1.0 gm/cm³, the ionisation constant of water is
(1) 1.0×10^{-16} (2) 1.0×10^{-14}
(3) 1.0×10^{-5} (4) 1.0×10^{-9}

126 A certain weak acid has a dissociation constant 1.0×10^{-4}, the equilibrium constant for its reaction with strong base is
(1) 1.0×10^{-4} (2) 1.0×10^{-14}
(3) 1.0×10^{10} (4) 1.0×10^{14}

127 A certain buffer solution contain equal concentration of X and HX. The Ka for X is 10^{-10} the pH of the buffer is
(1) 4 (2) 9 (3) 10 (4) 7

128 Find the pH of a solution prepared by mixing 25 ml of a 0.5M solution of HCl 10 ml of a 0.5 M solution of NaOH and 15 ml of water
(1) 4 (2) 3 (3) 0.82 (4) 0.10

129 Calculate the pH of a 10^{-8}M solution of $Ba(OH)_2$ if it undergoes complete ionisation ($K_w = 1 \times 10^{-14}$)
(1) 12.30 (2) 11.30
(3) 10.00 (4) 9.00

130 0.01 mole of sodium hydroxide is added to 10 litres of water How will the pH of water change ?
(1) 4 (2) 7 (3) 5 (4) 8

131 The degree of dissociation of acetic acid in a 0.1 M solution is 1.32×10^{-2}, find out the pKa
(1) 5.75 (2) 3.75
(3) 4.00 (4) 4.75

132 Calculate the pH of a 10^{-5} M HCl solution if 1ml of it is diluted to 1000 ml $kw = 1 \times 10^{-14}$.
(1) 7.98 (2) 6.98
(3) 7.00 (4) 5

133 Calculate the degree of hydrolysis of the 0.01 M solution of salt (KF) (K_a(HF) = 6.6×10^{-4})
(1) 3.87×10^{-6}
(2) 3.87×10^{-5}
(3) 3.87×10^{-7}
(4) None of these

134 For poly basic acid, the dissociation constant have a different valves for each step.
$H_2A \rightleftharpoons H^+ + HA^-$, Keq = K_{a_1}
$HA^- \rightleftharpoons H^+ + A^{2-}$ Keq = K_{a_2}
What is the observed trend of dissociation constant in successive stages ?
(1) $K_{a_1} > K_{a_2} > K_{a_3}$ (2) $K_{a_1} = K_{a_2} = K_{a_3}$
(3) $K_{a_1} < K_{a_2} < K_{a_3}$ (4) $K_{a_1} = K_{a_2} + K_{a_3}$

135 Equimolar solutions of HF, HCOOH and HCN at 298 K have the values of Ka as 6.8×10^{-4}, 1.8×10^{-4} and 4.8×10^{-9} respectively what will be the order of their acidic strength ?

(1) HF > HCN > HCOOH

(2) HF > HCOOH > HCN

(3) HCN > HF > HCOOH

(4) HCOOH > HCN > HF

136 NH_4CN is a salt of weak acid HCN ($K_a = 6.2 \times 10^{-10}$) and a weak base NH_4OH ($K_b = 1.8 \times 10^{-5}$) A one molar solution of NH_4CN will be :-

(1) Neutral (2) Strongly acidic

(3) Strongly basic (4) Weakly basic

137 The solubility product of $BaCl_2$ is 4×10^{-9} What will be its solubility in mol/L :-

(1) 4×10^{-3} (2) 3.2×10^{-9}

(3) 10^{-3} (4) 1×10^{-9}

138 Dissociation constant of CH_3COOH and NH_4OH in aqueous solution are 10^{-5} if pH of a CH_3COOH solution is 3, what will be the pH of NH_4OH ?

(1) 3.0 (2) 4.0

(3) 10.0 (4) 11.0

139 What is the minimum concentration of SO_4^{-2} required to precipitate $BaSO_4$ in a solution containing $1 \times 10^{-4} \frac{\text{mole}}{\text{L}}$ of Ba^{2+} (Ksp of $BaSO_4 = 4 \times 10^{-10}$) :-

(1) 4×10^{-10} M (2) 2×10^{-10} M

(3) 4×10^{-6} M (4) 2×10^{-3} M

140 The solubility product of AgCl is 1.5625×10^{-10} at 25°C its solubility in grams per litre will be :-

(1) 143.5 (2) 108

(3) 1.57×10^{-11} (4) 1.79×10^{-3}

141 Solubility product of radium sulphate is 4×10^{-8} What will be the solubility of Ra^{2+} in 0.10 M Na_2SO_4 ?

(1) 4×10^{-7} (2) 2×10^{-5} M

(3) 4×10^{-5} M (4) 2×10^{-10} M

142 Which of the following species can act as an acid as well as a base ?

(1) SO_4^{-2} (2) HSO_4^-

(3) PO_4^{-3} (4) OH^-

143 Which of the following salts will give basic solution on hydrolysis ?

(1) NH_4Cl (2) KCl

(3) K_2CO_3 (4) $(NH_4)_2CO$

144 In which of the following solvents silver chloride easily soluble ?

(1) 0.1 $\frac{\text{mol}}{\text{dm}^3}$ $AgNO_3$ solution

(2) 0.1 $\frac{\text{mol}}{\text{dm}^3}$ HCl solution

(3) H_2O

(4) Aqueous NH_3

145 pH of 10^{-6} M HCl (aq) is

(1) just less than 6 (2) exactly equal to 6

(3) just greater than 6 (4) just less than 7

146. How much water must be added to 300 mL of 0.2M solution of CH_3COOH ($Ka = 1.8 \times 10^{-5}$) for the degree of dissociation to double ?

(1) 600 ml (2) 900 ml

(3) 1200 ml (4) 1500 ml

147. Selenious acid (H_2SeO_3), a diprotic acid has $ka_1 = 10^{-3}$ and $Ka_2 = 10^{-8}$ respectively Approximate pH of 0.01M $NaHSeO_3$ is given by :-

(1) $pH = 7 + \frac{pKa_1}{2} + \frac{\log C}{2}$

(2) $pH = 7 \quad \frac{pKa_1}{2} \quad \frac{\log C}{2}$

(3) $pH \quad \frac{pKa + pKa_2}{2}$

(4) $pH = 7 + \frac{pKa_1}{2} \quad \frac{pKa_2}{2}$

148 Which of the following would increase the solubility of Pb(OH)

(1) Add HCl solution

(2) Add $Pb(NO_3)_2$ solution

(3) Add NaOH solution

(4) Solubility depends on temperature only

149 Solubility of AgCl in 0.2M NaCl is x and that in 0.1 M $AgNO_3$ is y Then which of the following is correct ?

(1) x = y (2) x > y

(3) x < y (4) Data insufficient

150. What is the pH of saturated solution of $Cu(OH)_2$? ($K_{sp} = 3.2 \times 10^{-20}$)
(1) 9.4 (2) 7.6 (3) 7.3 (4) 7.9

151. An acid base indicator has $K_{ind} = 3.0 \times 10^{-5}$. The acid form of the indicator is red and the base form is blue. The change (H^+) required to change the indicator from 75% red to 75% blue is
(1) 8×10^{-4} M (2) 9×10^{-5} M
(3) 10^{-4} M (4) 3×10^{-4} M

152. pKa of NH_4^+ is 9.26. Hence effective pH range for NH_4OH – NH_4Cl buffer is –
(1) 8.26 to 10.26 (2) 4.74 to 5.74
(3) 3.74 to 5.74 (4) 8.26 to 9.26

153. The pH of a solution of 0.10M CH_3COOH increases when which of the following substances is added ?
(1) $NaHSO_4$ (2) $HClO_4$
(3) KNO_3 (4) K_2CO_3

154. H_2CO_3 and $NaHCO_3$ consitute buffer system in blood and maintain its pH close to 7.4. An excess of acid entering the blood stream is removed by
(1) HCO_3^- (2) H_2CO_3
(3) H^+ (4) CO_3^{2-}

155. The pK_a for acid A is greater than pK_a for acid B, the strong acid is –
(1) B (2) A
(3) Both A and B (4) None of these

156. What is expression for Ksp for $PbCl_2$?
(1) $[Pb^{2+}]\,[2Cl^-]^2$ (2) $[Pb^+] / [2Cl^-]^2$
(3) $[Pb^{2+}]\,[Cl^-]^2$ (4) $[Pb^{2+}] / [Cl^-]^2$

157. What is the $[OH^-]$ in final solution prepared by mixing 20 ml of 0.050 M HCl with 30 ml of 0.10 M $Ba(OH)_2$?
(1) 0.10 M (2) 0.40 M
(3) 0.0050 M (4) 0.12 M

158. At 25°C, the solubility product of Hg_2Cl_2 in water is 3.2×10^{-17} $mol^3\ dm^{-9}$ what is the solubility of Hg_2Cl_2 in water at 25°C ?
(1) 1.2×10^{-4} M
(2) 3.0×10^{-6} M
(3) 2×10^{-6} M
(4) 1.7×10^{-15} M

159. When a buffer solution of CH_3COOH & CH_3COONa is diluted with water
(1) CH_3COO^- ion concentration increases
(2) H^+ ion concentration increases
(3) OH^- ion concentration increases
(4) H^+ ion concentration does not change

160. The solubility products of AgCl & AgI are 1.1×10^{-10} and 1.6×10^{-16} respectively. If $AgNO_3$ is added drop by drop to the solution containing both chloride and iodide ions. The salt which will precipitate first?
(1) Ag
(2) $AgNO_3$
(3) AgCl
(4) both AgCl and AgI simultaneously

161. In the hydrolysis equilibrium
$B^+ + H_2O \rightleftharpoons BOH + H^+$, $K_h = 1 \times 10^{-4}$
The hydrolysis constant is
(1) 10^{-5} (2) 10^{-10} (3) 10^{-10} (4) 10^{-9}

162. Which one of the following is an acidic salt
(1) Na_2HPO_3 (2) NH_4NO_3
(3) NaH_2PO_2 (4) $NaHCO_3$

163. Which of the is the conjugate base of OH
(1) O^{-2} (2) O (3) H_2O (4) O_2

164. CH_3NH_2(0.1 mole, $K_b = 5 \times 10^{-4}$) is added to 0.08 moles of HCl and the solution is diluted to one litre. The resulting hydrogen ion concentration is
(1) 1.6×10^{-11} (2) 8×10^{-1}
(3) 5×10^{-5} (4) 8×10^{-2}

165. If Na_2CO_3 is added to the solution of H_2CO_3, the pH of H_2CO_3 solution
(1) decreases (2) remains constant
(3) increases (4) cannot be predicted

166. Calcuate the pH of a solution containing 0.1 M CH_3COOH and 0.15 M CH_3COO^-
(K_a of $CH_3COOH = 1.8 \times 10^{-5}$)
(1) 9.1 (2) 3.9 (3) 10 (4) 4.91

167. In a saturated aqueous solution of AgBr concentration of Ag^+ ion is 1×10^{-6} mol L^{-1}. If K_{sp} for AgBr is 4×10^{-11} then concentration of Br^- in the solution is
(1) 1×10^{-6} mol L^{-1} (2) 4×10^{-6} mol L^{-1}
(3) 4×10^{-6} mol L^{-1} (4) 4×10^{-12} mol L^{-1}

168. A solution of an acid has pH = 4.70. Find out the concentration of OH^- ion ($pK_a = 14$)
(1) 5×10^{-5} (2) 5×10^{-10}
(3) 2×10^{-5} (4) 9×10^{-5}

169. Which of the following is not an example of buffer solution?
(1) $HNO_2 + KNO$
(2) $HF + KF$
(3) $PbNH + PbNH Cl$
(4) $Na_2C + HC$

170 Which of the following acid will release maximum amount of heat when completely neutralizes by strong base NaOH?
(1) 1 M HC (2) 1M HNO
(3) 1M H_2O_4 (4) 1M H_2SO_4

171 Which of the following is an example of hydrolysis reaction?
(1) $NH_4Cl \rightleftharpoons NH_4 + Cl$
(2) $NH_4^+ + H_2O \rightleftharpoons NH_4OH + H$
(3) $Na^+ + H_2O \rightleftharpoons NaOH + H^+$
(4) $CH_3COOH + HOC_2H_5 \rightleftharpoons CH_3COOC_2H_5 + H_2O$

172 Which of the following salt will have lowest pH?
(1) Na_2SO_4 (2) $(NH_4)_2SO_4$
(3) Na_2CO_3 (4) NaCl

173 What will be pH of 0.1 M NaCN solution if K_a for HCN is 10^{-9} at 25°C
(1) 6.5 (2) 9.5 (3) 3 (4) 7

174. The conjugate base of strong acid in the reaction $CH_3COOH + HC \rightleftharpoons Cl + CH_3COOH_2^+$ will be
(1) HCl (2) Cl
(3) CH_3COOH (4) $CH_3COOH_2^+$

175. What will be the degree of dissociation of 0.005 M NH_4OH solution. If pK_b for NH_4OH is 4.7
(1) 2% (2) 0.03% (3) 0.40% (4) 6.32%

176. Which of the following pairs can be used to form a buffer solution?
(1) $NaHSO_4$ and Na_2SO_4
(2) NaOC and NaCl
(3) NH_3 and NH_4Cl
(4) NaH_2PO_4 and NaCl

177 What is the molar solubility of MgF_2 in a 0.2 M solution of KF? ($K_{sp} = 8 \times 10^{-8}$)
(1) 8×10^{-6}M (2) 8×10 M
(3) 2×10^{-3} M (4) 2.7×10^{-4} M

178 If pK_a of acetic acid and pK_b of ammonium hydroxide are 4.7 each. The pH of ammonium acetate at 25°C is
(1) 7 (2) less than 7
(3) more than 7 (4) zero

179 The Ksp of $Mg(OH)_2$ is $1 \times 10^{-}$, 0.01 M Mg^{2+} will begin to precipitate at the pH of
(1) 3 (2) 9 (3) 5 (4) 8

180 What is the hydronium ion concentration of 0.25 M HA solution? ($K_a = 4 \times 10^{-11}$)
(1) 10^{-4} (2) 10^{-5} (3) 10 (4) 10^{-6}

181 The solubility of PbI$_2$ (molecular wt = 245) is 0.46 gm/L. What is solubility product?
(1) 1.1×10^{-16} (2) 2.6×10^{-8}
(3) $1.1 \times 10^{-}$ (4) 6.8×10^{-9}

182 What is molar solubility of Ag_2CO_3 (K_{sp} 4×10^{-1}) in 0.1 M Na_2CO_3 solution
(1) 10^{-8} (2) 10 3) 2×10^{-5} 4) $2 \times 10^{-}$

THERMODYNAMICS

183 For vapourisation of water at 1 atm. values of ΔH & ΔS are 40.6 KJ mol^{-1} and 108 JK^{-1} mol^{-1} respectively will be. The temperature when ΔG for this transition zero is
(1) 395.3K (2) 375.9K
(3) 373K (4) 380 K

184 Three moles of an ideal gas expanded spontaneously in to vacuum. Then which is correct ?
(1) $\omega = 0$, $\Delta G = 0$ (2) ω 0 $\Delta G < 0$
(3) $\omega = 0$, $\Delta G > 0$ (4) $\omega \neq 0$ $\Delta G = 0$

185 Match the following list with List II and select the correct option

	List-I		List-II
a	$k_p = Q$	i	Always non spontaneous
b	$T > \Delta H/\Delta S$	ii	Isothermal process
c	ΔH=+ve, ΔS=–ve	iii	Equilibrium
d	$q = w$	iv	spontaneous and endothermic

(1) a → (iii) b → (iv) c → (i) d → ( )
(2) a → ii, b → ( ) c → (iii), d → (iv)
(3) a → (i) b → ( ) c → (iv) d → ( )
(4) a → (i) b → (i) c → (ii d → ( )

186. From the following bond energies:
H–H bond energy = 420 K$_J$ mol^{-1}
C≡C bond energy = 601 K$_J$ mol^{-1}
C–C bond energy = 340 K$_J$ mo
C–H bond energy = 425 K$_J$ mo
Enthalpy for the reaction
C H + 2H$_2$ → C H$_4$
(1) 599 kJ mol^{-1}
(2) 580 kJ mol^{-1}
(3) 625 kJ mol^{-1}
(4) 325 kJ mol^{-1}

187. Which of the following state function (a) q + w, (b) q (c) w (d) heating isobaric process (e) work in adiabatic process :-
(1) a, b, c (2) a, e
(3) a, d, e (4) a, d

188. Consider the following reaction :
(a) $H^+_{(aq)} + Cl^-_{(aq)} \rightarrow HCl_{(g)}$; $\Delta H = -X_1$ KJ mol^{-1}
(b) $H_{2(g)} + Cl_{2(g)} \rightarrow 2HCl_{(g)}$, $\Delta H = X_2$ KJ mol^{-1}
(c) $\frac{1}{2}H_{2(g)} + \frac{1}{2}Cl_{2(g)} \rightarrow HCl_{(g)}$; $\Delta H = -X_3$ KJ mol^{-1}
(d) $H_{(g)} + Cl_{(g)} \rightarrow HCl_{(g)}$ $\Delta H = -X_4$ KJ mol^{-1}
Enthalpy of formation of $HCl_{(g)}$ is :
(1) $-X_1$ KJ mol^{-1}
(2) $-X_2$ KJ mol^{-1}
(3) $-X_3$ KJ mol^{-1}
(4) $-X_4$ KJ mol^{-1}

189. Assume each reaction is carried in open container. For which reaction ΔH > ΔE ?
(1) $H_{2(g)} + I_{2(g)} \rightarrow 2HI_{(g)}$
(2) $N_{2(g)} + 3H_{2(g)} \rightarrow 2NH_{3(g)}$
(3) $PCl_{5(g)} \rightarrow PCl_{3(g)} + Cl_{2(g)}$
(4) $SO_{2(g)} + \frac{1}{2}O_{2(g)} \rightarrow SO_{3(g)}$

190. Given that Bond energy of H_2 and N_2 are 400 KJ mol^{-1} and 240 KJ mol^{-1} respectively and ΔH_f of NH_3 is –120 KJ mol^{-1} calculate the bond energy of N–H bond :
(1) 300 K$_J$ mol^{-1} (2) 250 KJ mol^{-1}
(3) 410 KJ mol (4) 280 KJ mol^{-1}

191. The following reaction are given
$CH_{4(g)} + 2O_{2(g)} \rightarrow CO_{2(g)} + 2H_2O_{(g)}$ $\Delta H = x$
$C_{(s)} + O_{2(g)} \rightarrow CO_{2(g)}$, $2H_{2(g)}$, $\Delta H = y$
$H_{2(g)} + \frac{1}{2}O_{2(g)} \rightarrow H_2O_{(g)}$ $\Delta H = z$
Calculate the heat of formation of CH_4 ?
(1) x + y + z (2) y + 2z – x
(3) x – y – 2z (4) none of the above

192. The following two reactions are known
$N_{2(g)} + O_{2(g)} \rightleftharpoons 2NO_{(g)}$ $\Delta H = -27.1$ KJ
$2NO_{(g)} + O_{2(g)} \rightleftharpoons 2NO_{2(g)}$ $\Delta H = -83.5$ KJ
Calculate the enthalpy change for the reaction
$NO_{2(g)} \rightleftharpoons \frac{1}{2}N_{2(g)} + O_{2(g)}$
(1) –40.3 KJ (2) +80.6 K
(3) +40.3KJ (4) –80.6 K$_J$

193. ΔU° of combustion of methane is X KJ mol^{-1} The value of ΔH° is :-
(1) –X – 596R (2) –X+596R
(3) X+596R (4) X–596R

194. For the reaction
$2Cl_{(g)} \rightarrow C_{l_{2(g)}}$
What are the signs of ΔH and ΔS ?
(1) ΔH > 0, ΔS > 0
(2) ΔH < 0, ΔS < 0
(3) ΔH > 0, ΔS < 0
(4) ΔH < 0, ΔS > 0

195. The equilibrium constant for a reaction is 100 what will be the value of ΔG° ? R = 8.314 JK^{-1} mol^{-1}, T=300 K :-
(1) –11488 KJ (2) –11.488 KJ
(3) –12 KJ (4) –12000 KJ

196. Standard enthalpy of vapourisation ΔH° for water is 40.66 KJ mol^{-1} The internal energy of vapourisation of water for 1 mol will be
(1) +43.76 (2) +40.66
(3) +37.56 (4) None of these

197. During adiabatic expansion of ideal gas, which is correct ?
(1) Temperature increases
(2) q = 0
(3) Temperature remain constant
(4) ΔE = 0

198 A reversible process is one in which
(1) external pressure is constant throughout
(2) System is in equilibrium at initial & final stage
(3) Driving force is slightly greater than opposing force
(4) All of the above

199 For the reaction
$N_2O_{4(g)} \rightleftharpoons 2NO_{2(g)}$
$\Delta U = 2.0$ Kcal $\Delta S = 50$ Cal/K at 300 K
calculate ΔG ?
(1) +12.4 KCal (2) –12.4 KCal
(3) 6.4 KCal (4) +6.4 KCal

200 Consider the following process
$A \rightarrow 2B \quad \Delta H = +150$ KJ
$3B \rightarrow 2C + D \quad \Delta H = -125$ KJ
$G + A \rightarrow 2D \quad \Delta H = +350$ KJ
For $B + D \rightarrow G + 2C$; ΔH will be
(1) +525 KJ (2) +325 KJ
(3) –175 KJ (4) –325 KJ

201. Enthalpy change for the reaction
$2N_{(g)} + 6H_{(g)} \rightarrow 2NH_{3(g)}$ is –900 KJ
The dissociation energy of N–H bond is
(1) +450 KJ (2) –450 KJ
(3) +150 KJ (4) –150KJ

202. The heat of combustion of CH_4 is –400 KJ mol^{-1}. Calculate the heat released when 40g of H_2O is formed upon combustion ?
(1) +444.4 KJ (2) +888.8 KJ
(3) –444.4 KJ (4) –888.8 KJ

203 For a spontaneous process :-
(1) $\Delta G = 0$ (2) $\Delta G < 0$
(3) $\Delta G > 0$ (4) Any of the above

204 Which relation is incorrect
(1) $\Delta G = T\Delta S$
(2) $\Delta G^\circ = 2.303\ RT \log K$
(3) $\Delta H = \Delta U + \Delta n_g RT$
(4) $w_{isothermal} = \Delta H$

205 Which is correct at equilibrium -
(1) $\Delta G^\circ = 0$ (2) $\Delta G = 0$
(3) $\Delta S = 0$ (4) $\Delta E = 0$

206. 2 mol of an ideal gas at 27°C expands isothermally and reversibly from a volume of 4L to 40 L. The work done (in KJ) by the gas is
(1) w = – 28.72 KJ (2) w = 11.488 KJ
(3) w = 5.736 KJ (4) w = – 4.988 KJ

207 5 mol of ideal gas expand isothermally and irreversibly from a pressure of 10 atm to 1 atm against const. external pressure of 1 atm. work done at 300 K will be
(1) 15.921 KJ (2) 11.224 KJ
(3) 11.083 KJ (4) none of these

208. Match the column

	Column-I		Column-II
A	Adiabatic process	P	$q=0$
B	Isothermal process	Q	$\Delta H=0$
C	Isenthalpic process	R	$\Delta T=0$
D	Isentropic process	S	$\Delta S=0$

(1) A → P B → S, C → Q D → R
(2) A → Q, B → P, C → S, D → R
(3) A → P B → R, C → Q D → S
(4) A → P B → R C → S D → Q

209 Match the column

A	$C_{(s,\ graphite)} + O_{2(g)} \rightarrow CO_{2(g)}$	P	$\Delta H^\circ_{combustion}$
B	$CO_{(g)} + 1/2\ O_{2(g)} \rightarrow CO_{2(g)}$	Q	$\Delta H^\circ_{sublimation}$
C	$CH_{4(g)} \rightarrow C_{(g)} + 4H_{(g)}$	R	$\Delta H^\circ_{atomization}$
D	$C_{(s)} \rightarrow C_{(g)}$	S	$\Delta H^\circ_{formation}$

(1) A → R, B → S, C → P, D → Q
(2) A → R B → P, C → Q D → S
(3) A → P B → S, C → Q, D → R
(4) A → R B → P, C → S, D → Q

210. Match the column

	Sign of ΔH & ΔS respectively		Nature of reaction
	& -	P	Spontaneous only at low temperature
	& +	Q	Spontaneous only at high temperature
	+ & +	R	Spontaneous at all temperature
	+ &	S	non spontaneous at all temperature

(1) A → P, B → R, C → Q, D → S
(2) A → R, B → P, C → Q, D → S
(3) A → Q, B → R, C → P, D → S
(4) A → P, B → Q, C → R, D → S

211. Which of the following is correct for free expansion of ideal gas under isothermal condition :-
(1) q = 0, ΔT < 0, w < 0
(2) q = 0, ΔT = 0, w = 0
(3) q ≠ 0, ΔT = 0, w = 0
(4) q ≠ 0, ΔT = 0, w ≠ 0

212. The entropy of fusion of water is 5.260 cal/mole K calculate the enthalpy of fusion of water ?
(1) 10.52 KCal / mol (2) 0.525 KCal / mol
(3) 2.225 KCal / mol (4) 1.435 KCal / mol

213. $CH_4 + \frac{1}{2}O_2 \rightarrow CH_3OH$; ΔH = -ve

If enthalpy of combustion of CH_4 and CH_3OH is -x & -y respectively which relation is correct ?
(1) x > y (2) x < y
(3) x = y (4) x ≥ y

214 The value of ΔH and ΔS for the reaction $C_{graphite} + O_{2(g)} \rightarrow CO_{2(g)}$ are -100KJ and -100JK^{-1} respectively. The reaction will be spontaneous at :-
(1) 1000 K (2) 900 K
(3) 1100 K (4) At temperatures

215 The heat of neutralization of LiOH and H_2SO_4 at 25°C is 69.6 KJ mol^{-1}. Calculate the heat of ionisation of LiOH will be nearly
(1) 22.5 KJ mol^{-1} (2) 90 KJ mol^{-1}
(3) 45 KJ mol^{-1} (4) 33.6 KJ mol^{-1}

216 Criteria for spontaneity of process is
(1) Maximum Randomness
(2) Maximum energy
(3) Minimum energy and max randomness
(4) Minimum randomness and max energy

217 Standard entropy of N_2, and NH_3 are 60,40 and 50JK^{-1} mol^{-1} respectively. For the reaction,

$\frac{1}{2}N_2 + \frac{3H_2}{2} \rightleftharpoons NH_3$ ΔH = -30KJ to be at equilibrium, the temperature should be
(1) 500 K (2) 750 K
(3) 1000 K (4) 1250 K

218 The standard enthalpies of formation of CO, NO_2 and CO_2 are -110.5 kJ mol^{-1}, -33.2 kJ mol^{-1} and -393.5 kJ mol^{-1} respectively. The standard enthalpy of the reaction
$4CO(g) + 2NO_2(g) \rightarrow 4CO_2(g) + N_2(g)$ is
(1) -1065.6 kJ (2) -200 kJ
(3) -700 kJ (4) -850 kJ

219 18g of water is taken to prepare the tea. Find out the internal energy of vaporisation at 100°C. ($\Delta_{vap}H$ for water at 373 K is 40.66 kJ mol^{-1})
(1) 37.56 kJ mol^{-1} (2) -37.56 kJ mol^{-1}
(3) 43.76 kJ mol^{-1} (4) -43.76 kJ mol^{-1}

220 Given $C_{(s)} + O_{2(g)} \rightarrow CO_{2(g)}$, ΔH = -94.2Kcal

$H_{2(g)} + \frac{1}{2}O_{2(g)} \rightarrow H_2O_{(l)}$ ΔH = -68.3Kcal

$CH_{4(g)} + 2O_{2(g)} \rightarrow CO_{2(g)} + 2H_2O$ ΔH = -210.8 Kcal

what will be heat of formation of CH_4 in (Kcal)?
(1) +45.9 (2) -20.0 (3) +47.8 (4) 47.3

221. Which of the following is correct for a spontaneous process?
(1) ΔH < 0, ΔS>0 at all possible temperature
(2) ΔG > 0
(3) $\Delta S^0 > 0$
(4) $E_{cell} < 0$

222 Which among the following is an extensive property of the system?
(1) temperature (2) volume
(3) refractive index (4) viscosity

223 From the given information what is the standard enthalpy of formation for $Al_2O_3(s)$?
$2Al_2O_3(s) \rightarrow 4Al(s) + 3O_2(g)$; $\Delta H^\circ_{rxn} = 3352$ kJ
(1) 6704 kJ/mol (2) −3352 kJ/mol
(3) −1676 kJ/mol (4) 1676 kJ/mol

224 Which of the following thermodynamic properties must be associated with a reaction spontaneous at only high temperatures
(1) $\Delta H < 0, \Delta S < 0$ (2) $\Delta H < 0, \Delta S > 0$
(3) $\Delta H > 0, \Delta S > 0$ (4) $\Delta H > 0, \Delta S < 0$

225 Given enthalpy of formation of CO (g) and CaO(s) are −94.0 kJ and −158.0 kJ respectively and the enthalpy of the reaction $CaCO_3(s) \rightarrow CaO(s) + CO_2(g)$ is 92 kJ. The enthalpy of formation of $CaCO_3(s)$ is
(1) −42 kJ (2) −202 kJ
(3) 202 kJ (4) −288 kJ

226 If the ΔG° of a cell reaction
$AgCl + e^- \rightarrow Ag + Cl^-$ is −21.20 kJ
the standard emf of cell is
(1) 0.329V (2) 0.220V
(3) −0.220V (4) −0.110V

227 Consider the following reactions
$C(s) + O_2(g) \rightarrow CO_2(g)$ X kJ
$CO(g) + \frac{1}{2}O_2(g) \rightarrow CO_2(g)$ + Y kJ
The heat of formation of CO(g) is
(1) −(X+Y) kJ/mol (2) (X−Y) kJ/mol
(3) (Y−X) kJ/mol (4) (Y+X) kJ/mol

228 The enthalpy change for the following reaction is 368 kJ. Calculate the average O–F bond energy. $OF_2(g) \rightarrow O(g) + 2F(g)$
(1) 184 kJ/mol (2) 368 kJ/mol
(3) 536 kJ/mol (4) 736 kJ/mol

REDOX

229 In the reaction $SO_2 + 2H_2S \rightarrow 3S + 2H_2O$ the substance oxidised is
(1) S (2) SO_2 (3) H_2S (4) H_2O

230 The oxidation number of phosphorous in $Ba(H_2PO_2)_2$ is
(1) +3 (2) +2 (3) +1 (4) −1

231 Which of the following reaction do not involve oxidation reduction ?
(i) $2Cs + 2H_2O \rightarrow 2CsOH + H_2$
(ii) $2CaI_2 \rightarrow 2CaI + I_2$
(iii) $NH_4Br + KOH \rightarrow KBr + NH_3 + H_2O$
(iv) $4KCN + Fe(CN)_2 \rightarrow K_4Fe(CN)_6$
(1) I
(2) I, II
(3) I, II, IV
(4) II, IV

232 In the reaction
$3Br_2 + 6CO_3^{2-} + 3H_2O \rightarrow 5Br^- + BrO_3^- + 6HCO_3^-$
(1) Bromine is oxidised and carbonate is reduced
(2) Bromine is reduced and water is oxidised
(3) Bromine is neither reduced nor oxidised
(4) Bromine is both reduced and oxidised

233 Which of the following is not a disproportionation reaction
(A) $NH_4NO_3 \rightarrow N_2O + H_2O$
(B) $P_4 \rightarrow PH_3 + H_3PO_2$
(C) $PCl_3 \rightarrow PCl_5 + Cl_2$
(D) $I_2O_5 + CO \rightarrow I_2 + CO_2$
(1) I (2) I and IV
(3) I, IV (4) I, II

234 The number of moles of $K_2Cr_2O_7$ reduced by 1 mole of Sn^{2+} ions will be
(1) 1/3 (2) 3
(3) 1/6 (4) 6

235 The number of moles of $KMnO_4$ required to oxidise 2 mol of FeC_2O_4 in acid medium is
(1) 1.2 (2) 3.33 (3) 0.4 (4) 0.8

236 The oxidation number of 'P' in $Mg_2P_2O_7$ is
(1) +3 (2) +2 (3) +5 (4) +7

237 Which of the following acid possesses oxidising reducing and complex forming properties
(1) HNO_2 (2) H_2SO_4
(3) HCl (4) HNO_3

238 The number of electrons lost in the following change is
$Fe + H_2O \rightarrow Fe_3O_4 + H_2$
(1) 2 (2) 4 (3) 6 (4) 8

239 Which gas is evolved when PbO is treated with concentrated HNO_3
(1) NO (2) O_2 (3) N_2 (4) N_2O

240 For decolourisation of 1.5 mole of $KMnO_4$ the moles of H_2O_2 required is
(1) $\frac{3}{2}$ (2) $\frac{9}{4}$ (3) $\frac{15}{4}$ (4) $\frac{21}{4}$

241 In which transfer of five electrons takes place ?
(1) $CrO_4^{2-} \rightarrow Cr^{3+}$
(2) $MnO_4^- \rightarrow MnO_2$
(3) $Cr_2O_7^{2-} \rightarrow 2Cr^{3+}$
(4) $MnO_4^- \rightarrow Mn^{2+}$

242 In which reaction H_2O_2 acts as reducing agent ?
(1) $Ag_2O + H_2O_2 \rightarrow 2Ag + H_2O + O_2$
(2) $2K + H_2O_2 \rightarrow 2KOH + H_2$
(3) $PbS + 4H_2O_2 \rightarrow PbSO_4 + 4H_2O$
(4) $H_2O_2 + SO_2 \rightarrow H_2SO_4$

243 In the reaction $NO + H_2O_2 \rightarrow NO_2 + 2H_2O$ the value of x is
(1) 1 (2) 2
(3) 3 (4) None of these

244 What mass of HNO3 is needed to convert 1 kg of iodine into iodic acid according to the reaction $I_2 + HNO_3 \rightarrow HIO_3 + NO_2 + H_2O$?
(1) 12.4g (2) 24.8g
(3) 0.248 g (4) 49.6g

245. Oxidation number of Cl in $NOClO_4$ is :-
(1) +7 (2) -7 (3) +5 (4) -5

246 How many gram of $KMnO_4$ is contained 4 litre of 0.05 N solution. The $KMnO_4$ is to used as an oxidant in acid medium (M_w = 158) -
(1) 1.58 g (2) 15.8 g
(3) 6.32 g (4) 31.6 g

247 The equivalent mass of $MnSO_4$ is half of its molecular mass when it is converted to :-
(1) Mn_2O_3 (2) MnO_2
(3) MnO_4 (4) MnO_4^-

248 In the reduction of dichromate by Fe(II), the number of electrons involved per chromium atom is -
(1) 2 (2) 1 (3) 3 (4) 4

249. In acidic medium, 0.1M $KMnO_4$ may oxidise
(1) 0.15 M $C_2O_4^{2-}$ (2) 0.5 M Fe^{2+}
(3) 0.1b6 M FeC_2O_4 (4) 0.6M $Cr_2O_7^{2-}$

250. How many grams of I_2 are present in a solution which requires 10ml of 0.11 N $Na_2S_2O_3$ to react with it
$2S_2O_3^{2-} \rightarrow S_4O_6^{2-} + 2I^-$
(1) 12.7g (2) 0.558g (3) 25.4 g (4) 11.4g

251 In balancing the half reaction, $S_2O_3^{2-} \rightarrow S$, the number of electrons that must be added is -
(1) 2 on the right (2) 2 on the left
(3) 4 on the left (4) 4 on the right

252 What volume of 5 molar HNO_3 is needed to oxidise 8g of Fe^{2+} to Fe^{3+} while HNO_3 gets converted to NO
(1) 8 ml (2) 16 ml (3) 32 ml (4) 64 ml

253 In alkaline medium $KMnO_4$ reacts as per the reaction $2KMnO_4 + 2KOH \rightarrow 2K_2MnO_4 + H_2O + [O]$. Therefore its equivalent mass will be
(1) 31.6 (2) 52.7 (3) 79 (4) 158

254 The oxidation number of C in $K_4[Fe(CN)_6]$ is
(1) +3 (2) +4 (3) +2 (4) +1

255 The oxidation number of sulphur in the anions and oxyacid of sulphur (i.e. SO_3^{2-}, $S_2O_3^{2-}$, SO_4^{2-} and H_2SO_5) are respectively
(1) 8, +6, 6 (2) 6, 6, 8
(3) 6, +6, 6 (4) 8, 6, +7

256. $As_2S_3 + HNO_3 \rightarrow H_3AsO_4 + S + NO$
The element which is oxidised in the reaction is/are
(1) As (2) S (3) N (4) As and S

BEHAVIOUR OF GASES

257. A balloon is filled with hydrogen at room temp. It will burst if pressure exceeds 0.2 bar. If at first the pressure the gas occupies 2.2 litre volume, up to what volume can the balloon be expanded
(1) < 11.35 L (2) =11.35 L
(3) >11.35 L (4) upto any volume

258 On a ship sailing in pacific ocean where temp is 23.4°C A balloon is filled with 2L air what will be the volume of balloon when the ship reaches indian ocean where temp is 26.1°C
(1) 2.01L (2) 1.01L
(3) 2.01L (4) 1.02L

259 At 27°C and 500 mm Hg pressure a gas occupies 400 mL volume. What will be its pressure at a height where temp is 7°C and volume is 550 mL :-
(1) 340 mm (2) 240 mm
(3) 440 mm (4) 540 mm

260 A methane + H2 mixture contains 10g methane and 5g hydrogen. If the pressure of the mixture is 30 atm, what is the partial pressure of H2 in mixture
(1) 6 atm (2) 129 atm
(3) 24 atm (4) 189 atm

261. The temp. at which a real gas obeys ideal gas law over an appreciable range of pressure is called
(1) Boiling temp
(2) Freezing temp
(3) Boyle's temp
(4) Inversion temp

262 The pressure exerted by real gas is
(1) lower than ideal gas
(2) more than ideal gas
(3) equal to ideal gas
(4) can't be calculated

263 At critical temp. the value of z is
(1) $\frac{8}{3}$ (2) $\frac{3}{8}$ (3) $\frac{1}{8}$ (4) $\frac{1}{27}$

264 Which one of the following is true -
(i) At critical temp the surface separating two phases disappears
(ii) below critical temperature a gas is called vapour
(iii) A gas can't be liquified below critical temp
(iv) Higher the critical temp. difficult to liquify a gas
(1) (i), (ii), (iv) (2) (i), (ii), (iv)
(3) (iii), (iv) (4) (i), (ii)

265 Which one of the following is correctly matched

(i) z = 1	(A) -ve deviation
(ii) z < 1	(B) +ve deviation
(iii) z > 1	(C) Ideal behaviour
(iv) z_c = 3/8	(D) At critical conditions

(1) (i) -A (ii) -B (iii) -C (iv) -D
(2) (i) -B (ii) -A (iii) -D, (iv) -C
(3) (i) -C (ii) -A (iii) -B, (iv) -D
(4) (i) -D (ii) -B (iii) -A, (iv) -C

266. A real gas show ideal behaviour at
(1) High pressure, high temperature
(2) High pressure, low temperature
(3) low pressure, low temperature
(4) low pressure, high temperature

267 A 1 mol gas occupies 2.4L volume at 27°C and 10 atm pressure then it show
(1) +ve deviation (2) -ve deviation
(3) Ideal behaviour (4) None of these

268 The value of vander waal's constant a and b for two gases X and Y are 4.6, 0.04 (for X) and 5.1, 0.06 (for Y). Which can be liquified easily an application of pressure
(1) X (2) Y
(3) Both 1 & 2 (4) None of these

269 A gas X is diffused $\frac{1}{\sqrt{2}}$ times more than 'Y' at same temperature calculate V.D of gas X
(1) 64 (2) 128 (3) 32 (4) 16

270 The ratio of rate of diffusion for two gases is 1 : 2 their molecular masses
(1) 16 : 1 (2) 1 : 16 (3) 1 : 4 (4) 4 : 1

271 Which of the following gases always show positive deviation from ideal gas behaviour with increase in pressure?
(1) NH_3 (2) CO_2 (3) He (4) CH

272 If the ratio of the rates of diffusion of two gases A and B is 4:1 the ratio of their density is
(1) 1:16 (2) 1:4 (3) 1:2 (4) 1:8

273 Which of the following gas will have highest value of van der Waal's constant 'a'?
(1) H (2) He (3) C (4) NH

274 At high temperature and low pressure van der Waal's equation becomes
(1) $\left(P+\frac{a}{V^2}\right)=RT$ (2) PV = RT
(3) P(V-b)=RT (4) $P+\frac{a}{V^2}(V-b)=RT$

275 In the van der Waal's equation, the term $\frac{a}{V^2}$ is introduced to correct for
(1) the volume occupied by the molecules themselves
(2) the effect of kinetic energies of molecules
(3) the momentum changes when molecules collide
(4) the effect of forces of attraction between molecules

276 At relatively high pressure vander Waal's equation reduces to
(1) PV = RT (2) PV = RT $-\frac{a}{V}$
(3) PV = RT + Pb (4) PV = RT $+\frac{a}{V}$

SOLIDSTATE

277 The unit cell with parameters $\alpha = \beta = \gamma = 90°$ and a = b = c is
(1) cubic (2) triclinic
(3) Hexagonal (4) Tetragonal

278. Which of the following crystal lattice has maximum empty space ?
(1) Simple cubic
(2) Body centered cubic
(3) Face centered cubic
(4) All are correct

279 Molybdenum (At. wt. 96 g mol^{-1}) crystallises as BCC crystal. If density of crystal is 10.3 g/cm^3 then radius of Mo atom is -
(1) 111 pm (2) 314 pm
(3) 135.88 pm (4) None of these

280 In the closest packing of atoms A (radius r) the radius of atom of B that can be fitted in the tetrahedral void is -
(1) 0.155 r (2) 0.225 r
(3) 0.414 r (4) 0.732 r

281. In a face centered cubic arrangement of A and B atoms where A atoms are at the corners of the unit cell and B atoms are at face centers. One of the B atoms is missing from one of the faces in the unit cell. The simplest formula of compound is :-
(1) AB (2) A_4B_5
(3) A_2B_5 (4) $AB_{2.5}$

282 The coordination number of cation and anion in anti fluorite (Na_2O) is -
(1) 4 8 (2) 8 4
(3) 6 6 (4) 4 4

283 Select the correct statement for CsCl crystal
(1) Cs^+ forms simple cubic lattice, Cl^- forms simple cubic lattice
(2) Cl^- occupies the body center of Cs^+
(3) Cs^+ occupies the body center of Cl^-
4, All are correct

284 The radius of bivalent cation A^{2+} is 94 pm and univalent anion B$^-$ is 46 pm. The structure of compound AB is :-
(1) Rock salt
(2) Zinc blende
(3) Anti fluorite
(4) CsCl type

285 In a solid, ox ide ions are arranged in c.c.p. Atoms

A occupy $\left(\frac{1}{8}\right)^{th}$ of tetrahedral voids and atoms

B occupy $\left(\frac{1}{4}\right)^{th}$ of octahedral voids. The formula of compound is
(1) ABO_3 (2) AB_2O
(3) A_2BO_4 (4) AB_2O_4

286 The coordination number and number of carbon atoms in a unit cell of diamond is
(1) 4 and 4 (2) 4 and 8
(3) 8 and 4 (4) 6 and 6

287 CsBr has BCC type structure with edge length of 4.3 pm. The shortest internuclear distance between Cs and Br is
(1) 1.86 pm (2) 7.44 pm
(3) 4.3 pm (4) 3.72 pm

288 An element has a body centered cubic (BCC) structure with edge length of 288 pm. The density of the element is 7.2 g/cm^3. How many atoms are present in 208g of the element
(1) 8×10^{24} (2) 2.4×10^{24}
(3) 24×10^{24} (4) 12×10^{24}

289 A compound is formed by two elements M and N. The element N forms c.c.p. and atoms of M occupy $\left(\frac{1}{3}\right)^{rd}$ of tetrahedral voids, what is the formula of compound
(1) M_2N_3
(2) M_2N_3
(3) MN
(4) MN_3

290 X-ray diffraction studies of an element shows it crystallises in FCC unit cell with edge length 3.6×10^{-8} cm, in a separate experiment it is determined that density of element is 8.97 g/cm^3. Calculate the atomic mass of element ?
(1) 156 (2) 63
(3) 40 (4) 23

291 If 'r' stands for radius of atom of the cubic systems like simple cubic, body centered cubic and face centered cubic, then ratio of edge length of cube in these systems will be respectively

(1) $\frac{1}{2}r, \sqrt{3}r, \frac{1}{\sqrt{2}}$ (2) $\frac{1}{2}r, \frac{\sqrt{3}}{2}, \frac{\sqrt{2}}{2}r$

(3) $2r, \frac{4r}{\sqrt{3}}, \frac{4r}{\sqrt{2}}$ (4) $2r, \frac{4}{\sqrt{2}}, \frac{4r}{\sqrt{3}}$

292 The fraction of total volume occupied by the atoms present in FCC is

(1) $\frac{\pi}{6}$ (2) $\frac{\pi}{3\sqrt{2}}$ (3) $\frac{\pi}{4\sqrt{2}}$ (4) $\frac{\pi}{4}$

293 CaS exists in cubic closed packed structure of S^{2-} ions in which Ca^{2+} occupy tetrahedral voids what is the percentage of tetrahedral voids occupied by Ca^{2+}

(1) 25% (2) 50% (3) 75% (4) 100%

294 The atomic radius of strontium (Sr) is 215 pm and it crystalises in cubic closed packed structure. The edge length of cube is

(1) 430 pm (2) 608.2 pm

(3) 496.5 pm (4) None of these

295 Analysis shows that nickel oxide has formula $Ni_{0.98}O$ what fraction of nickel exists as Ni^{2+}

(1) 0.94 (2) 0.959 (3) 0.98 (4) 0.02

296 Which of the following is not a ionic solid ?

(1) NaCl (2) MgO (3) CsCl (4) SiC

297 For tetragonal crystal which statement is incorrect ?

(1) All the axial length are not equal

(2) Two axial angle are equal

(3) Two axial length are equal

(4) None of these

298 A solid compound PQ has CsCl structure. If the radius of cation is 120 pm then find radius of anion ?

(1) 88 pm (2) 140 pm

(3) 164 pm (4) 120 pm

299 The vacant space in simple cubic lattice unit cell is

(1) 32% (2) 52% (3) 48% (4) 25%

300 What will be value of r_{Na^+}/r_{Cl^-} in NaCl crystal having edge length 'a' ?

(1) $\frac{a\sqrt{3}}{2}$ (2) $\sqrt{2}a$ (3) $\frac{a}{2}$ (4) $\frac{a}{2\sqrt{2}}$

301 Which of the following posses both Schottky and Franke defect

(1) NaCl (2) AgCl (3) AgBr (4) KCl

302 The incorrect statement regarding defects in crystaline solids

(1) Density is crystal decreases in Schottky defect

(2) Franke defect is a dislocation defect

(3) Defects increase conductivity of solid

(4) Density of crystal increases in franke defect

303 Select the incorrect statement ?

(1) Stoichiometry of crystal remain unaffected due to schottky defect

(2) Franke defect is usually shown by ionic compounds having low coordination number

(3) F centers generation is responsible for imparting color to the crystal

(4) Density of crystal always increases due to substitutional impurity defect

304 When AgCl is dopped with 10^{-3} mole CdCl. What is number of cation vacancies ?

(1) $0.02\ N_A$ (2) $0.001\ N_A$

(3) 0.01 (4) 0.002

305 Number of tetrahedral void(s) per atom present in cubic closed packed structure is

(1) 2 (2) 4 (3) 8 (4) 1

306 If anions (A) form hexagonal closest packing cations (C) occupy 2/3rd octahedral voids in it then general formula of compound is

(1) CA (2) CA_2 (3) C_2A (4) C_3A

307 Total volume of atoms present in a fcc unit cell of metal is (r is atomic radius)

(1) $\frac{20}{3}\pi r^3$ (2) $\frac{24}{3}\pi r^3$

(3) $\frac{12}{3}\pi r^3$ (4) $\frac{16}{3}\pi r^3$

308 The distance between Na^+ and Cl^- ion in NaCl is 281 pm What is the edge length of the cube

(1) 1405 pm (2) 562 pm

(3) 843 pm (4) 281 pm

309 In a solid oxide ions are arranged in ccp form cations A occupy one sixth of THV and cations B occupy one third of the OV The empirical formula of compound is
(1) ABO (2) A_2B_3O (3) ABO_3 (4) AB_2O_3

310 In compound atoms A occupy 3/4 of the tetrahedral voids and atoms B form ccp lattice The emperical formula of the compound is
(1) AB_4 (2) A$_2$B (3) AB (4) A_4B_3

311 Copper crystallises in fcc with a unit cell length of 361 pm What is the radius of copper atom?
(1) 108 pm (2) 127 pm
(3) 157 pm (4) 181 pm

312 The coordination number of F^- ion in CaF_2 crystalline structure is
(1) 8 (2) 2 (3) 4 (4) 6

313 The number of atoms in 100 g of a fcc crystal with density d = 10g/cm^3 and cell edge is 100 pm
(1) 1×10^{25} (2) 2×10^{25}
(3) 3×10^{25} (4) 4×10^{25}

314. A face centred cubic is made up of two types of atoms A and B in which A occupies the corner positions and B occupies the face centres. If atoms along one of the body diagonal are removed, empirical formula of remaining solid will be
(1) AB_2 (2) A_2B (3) A_7B_3 (4) AB_4

315 A solid is formed and it has three types of atoms X, Y and Z, X forms a fcc lattice with Y atoms occupying all tetrahedral voids and Z atoms occupying half of octahedral voids. The formula of solid is
(1) X_4YZ_2 (2) X_4Y_2Z (3) XY_2Z_4 (4) X_2Y_4Z

316. An element X (at. wt. = 80 gm/mol) having fcc structure, calculate number of unit cell in 8 gm of X
(1) 0.4 N_A (2) 0.025 N_A
(3) 4 N_A (4) 0.2 N_A

317. In the rock salt AB if C is introduced in tetrahedral voids such that no distortion occurs. Then formula of resultant compound is
(1) ABC (2) ABC_2 (3) A_4B_4C (4) ABC_8

SOLUTION

318. In an aqueous solution ethylene glycol has the mass percentage (% w/w) 30% then the mole fraction of ethylene glycol will be
(1) 0.428 (2) 0.124
(3) 0.11 (4) 0.889

319 What will be the mass percentage of resulting solution prepared by mixing 15% (w/w) 500 g aqueous solution of urea with 25% (w/w) 400 g aqueous solution of it
(1) 18% (2) 20%
(3) 25% (4) 15%

320 What will be the molality of solution prepared by dissolving 3.7 g propanoic acid in 80 g benzene ?
(1) 0.77 m (2) 0.625 m
(3) 0.045 m (4) 46.25 m

321 If the sea water is 3.5% (w/w) aqueous solution of NaCl then its molality will be
(1) 0.598 (2) 36.27 m
(3) 0.62 m (4) 0.578 m

322. 10% (w/v) solution of glucose is isotonic with 4% (w/v) solution of non-volatile solution then molar mass of non-volatile solute will be
(1) 36 (2) 72
(3) 54 (4) 63

323. The vapour pressure of mixture of toluene and xylene at 90°C is 0.5 atm. If at this temperature vapour pressure of pure toluene and xylene are 400 mm and 150 mm respectively then what will be the mole fraction of toluene in mixture ?
(1) 0.08 (2) 0.92
(3) 0.88 (4) 0.46

324. What will be the freezing point of 0.2 molal aqueous solution of $MgBr_2$? If salt dissociates 40% in solution and K_f for water is 1.86 KKg mol^{-1} $MgBr_2$ -
(1) –3.35°C (2) –0.67°C
(3) –0.6°C (4) –0.45°C

325. Density of 12.25% (w/w) H_2SO_4 solution is 1.052 g/ml then molarity of solution is -
(1) 1.315 M (2) 2.63 M
(3) 0.657 M (4) 1 M

326. Incorrect relationship for mole fraction is -
(1) $x < 1$ (2) $0 < x < 1$
(3) $-2 < x < +2$ (4) Always positive

327 0.1 molal solution of $Hg(NO_3)_2$ freezes at –0.558°C The cryoscopic constant for water is 1.86 KKg mol^{-1} then what will be the percentage ionisation of salt ?
(1) 33.33% (2) 50%
(3) 75% (4) 100%

328 Which of the following solution has maximum vapour pressure :-
(1) N KNO (2) 1 N Ba(NO)
(3) N Al (SO) (4) 1 N T NO)

329 When HgI is added in KI solution The freezing point of solution :-
(1) Increases
(2) Decreases
(3) Remains unchanged
(4) Can't predict

330 A solute dissociate in solution according to reaction $2A \rightarrow 5B$, If solute shows 30% dissociation then van't Haff factor will be :-
(1) 2.2 (2) 1.45 (3) 2.9 (4) 1.9

331 An aqueous solution of urea [6% w/v] is isotonic with NaCl solution then mass-volume percentage (%w/v) of NaCl solution will be
(1) 1.46% (2) 5.85% (3) 2.92% (4) 11.7%

332. The vapour pressure of pure liquid A and liquid B at 350 K are 440 mm and 720 mm of Hg. If total vapour pressure of solution is 580 mm of Hg then the mole fraction of liquid A in vapour phase will be :-
(1) 0.31 (2) 0.38
(3) 0.62 (4) 0.76

333. The composition of Azeotropic mixture of $HCl+H_2O$ is :-
(1) 85% H_2O + 15 % HCl
(2) 50% H_2O + 50 % HCl
(3) 70% H_2O + 29.2 % HCl
(4) 79.8% H_2O + 20.2 % HCl

334 In any binary azeotropic mixture :
(1) volatility of A > volatility of B
(2) volatility of A < volatility of B
(3) volatility of A = volatility of B
(4) volatility of A = 2 × volatility of B

335 If T_A, T_B and T_C are boiling points of component A, Component B and azeotropic mixture then which of the following relation is correct for a minimum boiling azeotrope
(1) T_C > (2) T_C < T
(3) T T_1 (4) $T_C = T_A$

336. Which of the following relation are correct
(1) $K_f = \frac{RT_f^2}{1000 \times \Delta V_f}$ (2) $K_f = \frac{R}{\text{[illegible]}}$
(3) $K_f = \frac{RT}{1000 \times \Delta H_f}$ (4) $\pi = \frac{RT}{\text{[illegible]}}$

337 Which one is a colligative property
(1) Depression in freezing point of solute
(2) Elevation in boiling point of solution
(3) Osmotic pressure of solvent
(4) Relative lowering in vapour pressure of solvent

338 Which of the following 0.2m aqueous solutions will show minimum freezing point
(1) CaCl (2) K_2SO_4
(3) $Al(NO_3)$ (4) KBr

339 For which of the following solutions observed boiling point is greater than theoretical boiling point ?
(1) $CHCl_3 + CCl_4$ (2) CCl_4 + Solute
(3) $C_2H_5OH + C_6H_6$ (4) $CHCl_3 + C_6H_6$

340. The boiling point of solution obtained by dissolving 0.51 g anthracene in 35 g chloroform increases by 0.32°C then what will be the molar mass of anthracene if for chloroform K_b = 3.9 K Kg mol
(1) 175.2 (2) 177.6
(3) 178.6 (4) 182.3

341. Which of the following relationship is correct ?
(1) $\frac{P^\circ - P_s}{P^\circ} = \chi_A$ (2) $Y_A = \frac{P_A}{P_A^\circ}$
$P_A = P_A^\circ \chi_A$
(3) $P_A = P^\circ \chi_A$ (4) $P_s = P^\circ \chi_B + P^\circ \chi_A$

342 What will be the osmatic pressure of 5% (w/v) aqueous solution of urea at 17°C ?
(1) 19.84 atm (2) 1.16 atm
(3) 1.984 atm (4) 5.61 atm

343 Van't Hoff factor is 1.92 for MgI solution with concentration 0.2M then the degree of dissociation of salt at this concentration is
(1) 46% (2) 96%
(3) 30.67% (4) [illegible]

344 The vapour pressure of any liquid shows following change with temperature
(1) Exponential increase
(2) exponential decrease
(3) Linear increase
(4) Linear decrease

345 During evaporation
(1) Cooling of liquid occurs
(2) Heating of liquid occurs
(3) Viscosity of liquid decreases
(4) Viscosity of liquid increases

346. The composition of gaseous mixture used by scuba divers is :-
(1) 79% N_2, 21% O_2
(2) 70.1% N_2, 22.2% O_2, 7.7% He
(3) 56.2% N_2, 32.1% O_2, 11.7 % He
(4) 32.1 % N_2, 56.1 % O_2, 11.8 % He

347. The solubility of gases in liquid is maximum at :
(1) Low temperature and low pressure
(2) Low temperature and high pressure
(3) High temperature and high pressure
(4) High temperature and low pressure

348. If solubility of vinyl chloride (g) is 0.09 M at STP then value of henry's constant will be :-
(1) 0.0016 bar (2) 617.284 bar
(3) 6.17×10^{-4} bar (4) 308.642 bar

349 Which of the following statement is incorrect :
(1) In solution of volatile liquids partial pressure of any component is directly proportional to its mole fraction in solution
(2) In closed container in equilibrium of two volatile liquids and their vapour, mole fraction of more volatile component is higher in vapour phase
(3) Total vapour pressure of solution of binary volatile liquids, decreases on increasing mole fraction of any component
(4) Roult's law is a special case of Henry's law in which the values of K_H and p^* are identical

350. What will be the osmotic pressure of 0.03 N solution of Aluminium sulphate solution at 27°C ? if in solution salt dissociates 90%
(1) 0.566 atm (2) 0.677 atm
(3) 3.399 atm (4) 4.065 atm

351 What will be the amount of ice separated on cooling solution of 40g ethylene glycol in 400 g water upto -9.3° C ? (K, for water is 1.86 K Kg mol^{-1})
(1) 77.78 g (2) 129.03 g
(3) 222.22 g (4) 270.97 g

352 Which one of the following solution has maximum vapour pressure at 27°C temperature ?
(1) 1M Na_2SO_4 (2) 1 M $AlCl_3$
(3) 1M KBr (4) 1M $MgCl_2$

353 At 298 K 1000 cm^3 of a solution containing 4.34 g of solute shows osmotic pressure of 2.5 atm. What is the molar mass of solute?
(R = 0.0821 L atm K^{-1} mol^{-1})
(1) 41.64 g mol^{-1} (2) 82.73 g mol^{-1}
(3) 58.31 g mol^{-1} (4) 91.65 g mol^{-1}

354. Which of the following will have maximum depression in freezing point?
(1) 0.5 M Li_2SO_4
(2) 1M KCl
(3) 0.5 M $BaCl_2$
(4) 1M $Al_2(SO_4)_3$

355 1.00 g of a non electrolyte solute is dissolved in 50g of benzene which lowers the freezing point of benzene by 0.40K. The freezing point depression constant of benzene is 5.12 K kg mol^{-1}. Find the molar mass of the solute
(1) 206 g mol^{-1} (2) 226 g mol^{-1}
(3) 246 g mol^{-1} (4) 256 g mol^{-1}

356 At 40°C the vapour pressure of pure benzene and toluene are 160 mmHg and 60 mmHg respectively. If equimolar above liquids are mixed at same temperature to form an ideal solution. Then vapour pressure of solution will be
(1) 140 mm of Hg
(2) 110 mm of Hg
(3) 220 mm of Hg
(4) 100 mm of Hg

357 Dissolving 120 g of urea (mol wt = 60) in 1000 g of water gave a solution of density 1.15 g mL. The molarity of the solution is
(1) 1.78 M (2) 2.00 M
(3) 2.05 M (4) 2.22 M

358. A binary liquid solution is prepared by mixing n-heptane and ethanol which one of the following statement is correct regarding the behaviour of the solution?
(1) the solution formed is an ideal solution
(2) the solution is non ideal showing positive deviation from Raoult's law
(3) the solution is non ideal showing negative deviation from Raoult's law
(4) n-heptane shows positive deviation while ethanol shows negative deviation from Raoult's law

359 What is the gram molecular mass of a non-ionizing solid if 10 g of this solid dissolved in 100 g of water, forms a solution which froze at -1.22 °C? (K_f = 1.86 K kg mol^{-1})
(1) 265 g/mol (2) 152 g/mol
(3) 130g/mol (4) 65g/mol

360. At 293 K, vapour pressure of pure benzene is 75 mm of Hg and that of pure toluene is 22 mm of Hg. The vapour pressure of the solution which contains 20 mol% benzene and 80 mol % toluene is
(1) 32.6 mm Hg (2) 64.4 mm Hg
(3) 97 mm Hg (4) 3.26 mm Hg

361. The vapour pressure of pure liquid solvent is 0.80 atm. When a non-volatile substance (Z) is added to the solvent, its vapour pressure drops to 0.6 atm. What the mole fraction of the substance (Z) in the solution
(1) 0.75 (2) 0.50 (3) 0.25 (4) 0.33

362. What will be normality of 20V H_2O_2 solution?
(1) 1.78 N (2) 3.56 N
(3) 10N (4) 0.28 N

363 Which of the following solution have highest boiling point. (Assume all salts completely dissociates)
(1) 0.1M $Al_2(SO_4)_3$ (2) 0.1M $BaCl_2$
(3) 0.1M glucose (4) 0.1M $AlCl_3$

364 What will be the freezing point (in °C) of solution obtained by dissolving 0.1 g potassium ferricyanide (mol wt = 329) in 100 g water. If K_f for water is 1.86 K kg mol^{-1}
(1) -2.3×10^{-2} (2) -5.7×10^{-2}
(3) 5.7×10^{-3} (4) 1.2×10

365 The van't Hoff factor for 0.1M $Ba(NO_3)_2$ solution is 2.74. The degree of dissociation is
(1) 91.3% (2) 87% (3) 100% (4) 74%

366 A solution of a substance containing 1.05 g per 100 mL was found to be isotonic with 1% glucose solution. The molecular mass of substance is
(1) 31.5 (2) 6.3 (3) 630 (4) 63

367 The vapour pressure of benzene at 90°C is 1020 torr. A solution of 5g of a solute in 58.5 g benzene has vapour pressure 990 torr. The molecular mass of the solute is
(1) 78.2 (2) 178.2 (3) 200 (4) 220

368 Which of the following has minimum freezing point
(1) 0.1M $K_2Cr_2O_7$ (2) 0.1M NH_4Cl
(3) 0.1M $BaSO_4$ (4) 0.1M $Al_2(SO_4)_3$

369 What is the correct sequence of osmotic pressure of 0.01 M aq solution of
(a) $Al_2(SO_4)_3$ (π_1) (b) Na_3PO_4 (π_2)
(c) $BaCl_2$ (π_3) (d) Glucose (π_4)
Choose the correct option
(1) $\pi_4 > \pi_2 > \pi_3 > \pi_1$ (2) $\pi_1 > \pi_4 > \pi_2 > \pi_3$
(3) $\pi_3 > \pi_4 > \pi_1 > \pi_2$ (4) $\pi_2 > \pi_1 > \pi_3 > \pi_4$

CHEMICAL KINETICS

370. Which of the following rate law expression represent zero order reaction
(1) $K(A)^{1/2}(B)^{-1}(C)^{1/2}$
(2) $K(A)^0(B)^2$
(3) $K(A)^{1/2}(B)^{1/2}(C)^{-1}$
(4) $K(A)^2(B)$

371. The ratio of $t_{0.75}$ and $t_{0.5}$ for first order reaction
(1) 4 : 3 (2) 3 : 2
(3) 2 : 1 (4) 1 : 2

372. The correct expression for Arrehenius equation
(1) $\ln k = \ln A - \frac{E}{RT}$
(2) $k e^{-E/RT} = A$
(3) $\frac{1}{2.303}\log k = \log A - 2.303\frac{E}{RT}$
(4) $K = A e^{-E/RT}$

373 For every 10°C increase in temperature the rate becomes twice so the temperature increase from 10°C to 100°C then rate becomes times
(1) 400 (2) 512 (3) 112 (4) 614

374 The specific rate of reaction for the first order reaction depends up on

1) pressure

(2) temperature

,3) concentration of reaction

4) concentration of the product

375. The rate constant for zero order reaction is 3×10^{-2} mol $^{-1}$ sec $^{-1}$ After 25 sec If the concentration of reactant is 0 5M then initial concentration of the reactant is

(1) 1 M (2) 1 25 M

(3) 0.5 M (4) 0 75

376 The plot of ln K versus $\frac{1}{T}$ is linear with slope of

(1) $-\frac{E_a}{R}$,2) $+\frac{E_a}{R}$

(3) $\frac{E_a}{2\ 303R}$ (4) $\frac{E_a}{2\ 303R}$

377 For a first order gaseous reaction $A \rightarrow 2B+C$ initial pressure is P and total pressure of after time t is P then expression of K Rate constant

(1) $K = \frac{2\ 303}{t} \log \frac{2P}{3P_i - P_t}$

(2) $K = \frac{2\ 303}{t} \log \frac{2P_i}{B2P_i - P}$

(3) $K = \frac{2\ 303}{t} \log\left(\frac{P}{P_i - P}\right)$

(4) None of these

378 In a reaction $N_{2(g)} + 3H_{2(g)} \rightarrow 2NH_{3(g)}$ rate of appearance of NH is $2\ 5 \times 10^{-4}$ mo /sec then rate of reaction and rate of disappearance of H respectively is

(1) $3\ 75 \times 0^{-4}$ $1\ 25 \times 10^{-4}$

(2) $1\ 25 \times 10^{-4}$, $2\ 5 \times 10^{-4}$

(3) $1\ 25 \times 10^{-4}$ $3\ 75 \times 10^{-4}$

(4) 5×10^{-4} $3\ 75 \times 10^{-4}$

379. Rate of formation of SO_3 in this reaction is $1\ 6 \times 10^{-4}$ kg/min

$2SO_2 + O_2 \rightarrow 2SO_3$ han rate at which SO_2 reacts is

(1) $1\ 6 \times 10^{-2}$ kg/min

(2) 8×10^{-4} kg/min $^{-1}$

(3) $3\ 2 \times 10^{-1}$ kg min $^{-1}$

(4) $1\ 28 \times 10^{-3}$ kg min

380 Calculate the order of the reaction in A and B

A (mol/l)	B (mol/l)	Rate
0 05	0 05	$1\ 2 \times 10^{-3}$
0 10	0 05	$2\ 4 \times 10^{-3}$
0 05	0 10	$1\ 2 \times 10^{-1}$

(1) 1 and 0 ,2) 1 and 1

(3) 0 and 1 ,4) none of these

381 The rate law of reaction $A + 2B \rightarrow$ product is given by $r = K(A)\ (B)^1$. If A is taken in long excess the order of the reaction will be

(1) zero (2) 1 (3) 2 (4) 3

382. The half life for the first order reaction $A \rightarrow B + C$ is 24 hrs. starting with 10g of A how many grams of A will remain after 96 hours

(1) 1 25 g (2) 0 63 g

(3) 1 77 g (4) 0 5 g

383. Rate of reaction increase with temperature

(1) of any reaction

(2) of exothermic reaction

(3) of endothermic reaction

(4) of none

384 If concentration reactant is increased by 2 times then K becomes

(1) $\frac{K}{2}$ (2) $\frac{K}{2}$

(3) 2k (4) k

385 K is rate constant at temp T then value of $\lim_{T \to \infty} \log K$ is equal to

(1) A/2 303 (2) A

(3) 2 303 A (4) ∞ A

386. The activation energy for a chemical reaction depends upto -
(1) Temperature
(2) Nature of reacting specify
(3) Concentration of the reacting species
(4) Collision frequency

387. For an endomermic reaction energy of activation is E_a and enthalpy of reaction is ΔH (both of these in KJ/mol) The value of E_a will be
(1) equal to zero (2) less than ΔH
(3) equal to ΔH (4) more than ΔH

388. For a reaction $r = K(A)^{3/2}$ then unit of rate of reaction and rate constant respectively :-
(1) $molL^{-1}S^{-1}$, $mol^{-1/2}L^{1/2}S^{-1}$
(2) $mol^{-1}L^{-1}S^{-1}$, $mol^{-1/2}L^{1/2}S^{-1}$
(3) $molL^{-1}S^{-1}$, $mol^{-1/2}L^{1/2}S^{-1}$
(4) mol, $mol^{-1/2}L^{1/2}S$

389. The rate of first order reaction is 1.5×10^{-2} mol L^{-1} min^{-1} at 0.5M concentration of the reactant. The half life of the reaction is -
(1) 7.53 min (2) 0.383 min
(3) 23.1 min (4) 8.73 min

390. The $t_{1/2}$ of a reaction is halved as the initial concentration of the reactant is double then order of reaction -
(1) 1 (2) 0
(3) 2 (4) 3

391. For this reaction

$$N_{2(g)} + 3H_{2(g)} \rightarrow 2NH_{3(g)}$$

The relation beeween $\frac{d(NH_3)}{dt}$ and $-\frac{d(H_2)}{dt}$ is

(1) $\frac{d(NH_3)}{dt} = -\frac{1}{3}\frac{d(H_2)}{dt}$

(2) $+\frac{d(NH_3)}{dt} = -\frac{2}{3}\frac{d(H_2)}{dt}$

(3) $+\frac{d(NH_3)}{dt} = -\frac{3}{2}\frac{d(H_2)}{dt}$

(4) $\frac{d(NH_3)}{dt} = \frac{d(H_2)}{dt}$

392. Activation energy of the reaction $A \rightarrow B + 3BKCal$ is 20KCal then activation energy of the reaction $B \rightarrow A$ will be
(1) 20 KCal (2) 20KCal
(3) 18 KCal (4) 58KCal

393. For a reaction rate = $K(A)^2(B)^2$ If concentration of A and B are increased by factor of 4 and 2 respectively then rate is changed by the fraction -
(1) 4 (2) 6
(3) 8 (4) None of these

394. The reaction $2A+B \rightarrow$ product, follow the mechanism

$$2A \rightleftharpoons A_2 \text{(fast)}$$
$$A_2+B \rightarrow P \text{(slow)}$$

The order of the reaction is
(1) 1.5 (2) 3 (3) 1 (4) 2

395. Which of following is correct for zero order and first order (a → Initial concentration) -
(1) $t_{1/2} \propto a$, $t_{1/2} \propto \frac{1}{a}$ (2) $t_{1/2} \propto a$ $t_{1/2} \propto a^0$
(3) $t_{1/2} \propto a^0$, $t_{1/2} \propto a$ (4) $t_{1/2} \propto a$, $t_{1/2} \propto \frac{1}{a^2}$

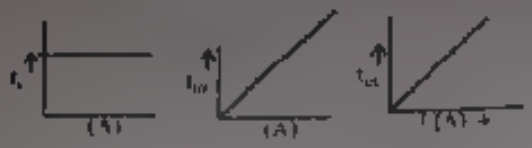
396. Which of following represents the expression for $\frac{3}{4}$th life of first order reaction -
(1) $\frac{K}{2.303}\log\frac{4}{3}$ (2) $\frac{2.303}{K}\log\frac{3}{4}$
(3) $\frac{2.303}{K}\log 4$ (4) $\frac{2.303}{K}\log 3$

397. The rate constant for first order reaction whose half life is 480 sec -
(1) 1.44×10^{-3} (2) 1.44 sec^{-1}
(3) 0.72×10^{-3} (4) 2.88×10^{-3} sec^{-1}

398. 

For this parallel first order reaction then find out percentage of B = ? -
(1) 40% (2) 60% (3) 50% (4) 90%

399. consider the p ots for a reaction nA → B+C
These p ots respect vely correspond to the reaction order



(I) (II) (II)

(1) 0,1,2 (2) 1,2,3
(3) 1,0,2 (4) None of these

400 The ha f life of a f rst order react on is 6 hour How long will it take for the concentration of reactant to change from 0.8 M to 0.25 M?

(1) 1 07 hour (2) 5.1 hour
(3) 2.7 hour (4) 10.07 hour

401 The concentration of a reactant in solution decreases from 0 5 M to 0 25 M in 5 hours and from 1.0 M to 0 25 M is 10 hours. The order of the react on will be

(1) 2 (2) 1 (3) 3 (4) 0

402. Which of the following is the correct expression for Arrhenius equation?

(1) $\ln \frac{K_2}{K} = \frac{E_a}{R}\left(\frac{1}{T_1} - \frac{1}{T_2}\right)$

(2) $\log \frac{K_2}{K} = \frac{E_a}{2.303} \frac{T_1 T_2}{T}$

(3) $\ln \frac{K_2}{K_1} = \frac{E_a}{2.303R}\left(\frac{1}{T_1} - \frac{1}{T}\right)$

(4) $\frac{K_2}{K_1} = \frac{E_a}{2.303R}\left(\frac{T_2 - T_1}{T_1 T_2}\right)$

403. For a first order reaction A →B. the time taken to reduce to 1/4 of init a concentration is 10 min. The time required to reduce to 1/16 of init a concentration will be

(1) 10 min (2) 20 min
(3) 4.46 min (4) 2.24 min

404. For the reaction, $2N_2O_5 \rightarrow 4NO_2 + O_2$ rate and rate constant are 1.02×10^{-4} M sec^{-1} and 3.4×10^{-5} sec^{-1} respectively, the concentration of N_2O_5 at that time will be

(1) 1.732 M (2) 3M
(3) 1.02×10^{-4} M (4) 3.5×10^{4}M

405. f or the reactor $N_2O_5(g) \rightarrow N_2O_4(g) + \frac{1}{2}O_2(g)$ if , nitial pressure is 114 atm and after 20 sec the pressure of reaction m xture becomes 1 1 min then the average rate of reaction will be

(1) 1 9 atm S^{-1} (2) 8.75×10^{-3} atm S^{-1}
(3) 2.5×10^{-2} atm S^{-1} (4) 6.65 atm S^{-1}

406 Reac on A+B →C+D is started w th 1M of each A and B and follows the rate law

$$r = k[A]^{1/2}[B]^{3/2}$$

What is the time taken for the concentration of A to drop to 0.1M ($K = 2.303 \times 10^{-3}$ sec)

(1) 57 sec (2) 100 sec
(3) 434 sec (4) 1000 sec

407. 75% of a first order reaction was found to complete in 32 minute. When will 50% of the same reaction will complete

(1) 24 min (2) 16 min
(3) 8 min (4) 4 min

408. Half lives of a first order and zero order are same. Then the ratio of the initia rates of the f rst order reaction to that of zero order reaction is [initial conc. of reactant = 1 Molar]

(1) 1/0 693 (2) 2 × 0 693
(3) 2/0 693 (4) 6 93

409. The rate of reaction is expressed

$$+\frac{1}{2}\frac{d[C]}{dt} = -\frac{1}{3}\frac{d[D]}{dt} = +\frac{1}{4}\frac{d[A]}{dt} = -\frac{d[B]}{dt}$$

the reaction is

(1) 4A + B →2C +3D
(2) B + 3D → 4A + 2C
(3) A+B→ C+D
(4) B+D→ A+C

ELECTROCHEMISTRY

410 A hypothetical electrochemical cell s shown below

$$^{\ominus}Pt(s)|A_2(1atm)|A^{-}(XM)\|B^{+}(yM)\,B(s)^{\oplus}$$

The emf measured is 0.30V The cell reaction is

(1) $A_2 + 2B^{+} \rightarrow 2A^{-} + 2B$
(2) $A_2 + 2e^{-} \rightarrow 2A^{-}$; $2B^{+} + 2e^{-} \rightarrow 2B$
(3) The cell reaction cannot be predicted
(4) $2A^{-} + 2B \rightarrow A_2 + 2B$

411 .f $E^{\circ}_{A^-/A}$ -0 30 V and $E^{\circ}_{A^-/A}$ = 0 40 V the st n dard E mf of the reaction A + 2A → 3A w be

(1) 0.30 V (2) 0 40 V
(3) 0 70 V (4) 0.10 V

412 The equilibrium constant of the reaction
$Zn(s) + 2Ag^+(aq) \rightarrow Zn^{2+}(aq) + 2Ag(s)$ $E^\circ = 1.50V$ at 298 K is
(1) 2.6×10^{52} (2) 8.7×10^{1}
(3) 6.1×10^{30} (4) 6.6×10^{5}

413 On the basis of the following E° values, the strongest oxidising agent is
$K^+ + e^- \rightarrow K$ $E^\circ = -2.923$ V
$Mg^{2+} + 2e^- \rightarrow Mg$ $E^\circ = -2.337$ V
(1) K^+ (2) Mg^{2+}
(3) K (4) Mg

414 The equivalent conductance of $\frac{M}{20}$ solution of a weak monobasic acid is 10 mhos cm^2 and at infinite dilution is 200 mhos cm^2. The dissociation constant of this acid is :-
(1) 1.25×10^{-4} (2) 1.25×10^{-5}
(3) 1.25×10^{-6} (4) 6.26×10^{-4}

415 Given $Fe^{2+} + 2e^- \rightarrow Fe(s)$ $E^\circ = -0.447V$
$Fe^{+2} \rightarrow Fe^{+3} + e^-$ $E^\circ = -0.771V$
Find E° for the reaction $Fe^{+3} + 3e^- \rightarrow Fe(s)$
(1) 0.34 V (2) –0.041V
(3) +0.39 V (4) –0.47 V

416. An increase in molar conductance of a strong electrolyte with dilution is mainly due to :-
(1) Increase in number of ions
(2) Increase in ionic mobility of ions
(3) 100% ionisation of electrolyte at normal dilution
(4) Increase in both i.e. number of ions and ionic mobility of ions.

417 For the reduction of silver ions with copper metal, the standard cell potential was found to be + 0.40 V at 25°C. The value of standard Gibbs energy ΔG° will be (F = 96500 C mol^{-1}):-
(1) 70 KJ (2) 77.2 KJ
(3) -88 KJ (4) +90KJ

418. Which relation of emf of a electrochemical cell is correct
(1) emf of cell = oxidation potential of anode + reduction potential of cathode
(2) emf of cell = oxidation potential of anode + reduction potential of cathode
(3) emf of cell = reduction potential of anode + reduction potential of cathode
(4) All of these

419 Which of the following expression correctly represents the equivalent conductance at infinite dilution of $Ca_3(PO_4)_2$ Given $\lambda^\circ_{Ca^{2+}}$ and $\lambda^\circ_{PO_4^{3-}}$ are the equivalent conductance at infinite dilution of the respective ions
(1) $\lambda^\circ_{Ca^{2+}} + \lambda^\circ_{PO_4^{3-}}$ (2) $(\lambda^\circ_{Ca^{2+}} + \lambda^\circ_{PO_4^{3-}}) \times 6$
(3) $\frac{1}{2}\lambda^\circ_{Ca^{2+}} + \frac{1}{3}\lambda^\circ_{PO_4^{3-}}$ (4) $3\lambda^\circ_{Ca^{2+}} + 2\lambda^\circ_{PO_4^{3-}}$

420 If the E°_{cell} for a given reaction has a positive value then which of the following gives the correct relationship for the values of ΔG° and K_{eq}
(1) $\Delta G^\circ < 0$ $K_{eq} > 1$ (2) $\Delta G^\circ > 0$ $K_{eq} > 1$
(3) $\Delta G^\circ > 0$ $K_{eq} < 1$ (4) $\Delta G^\circ < 0$ $K_{eq} = 1$

421 Standard electrode potential Au^{3+}/Au couple is 1.428 V and that for Na$^+$/Na couple is –2.714 V. These two couples in their standard state are connected to make a cell. The cell potential will be
(1) 4.142 (2) 1.286 v
(3) -1.286 v (4) 3.376 v

422 Standard electrode potentials of three metals A, B and C are –1.5V, 0.8V and –2.71V respectively. The reducing power of these metals will be :-
(1) B > C > A (2) B > A > C
(3) C > A > B (4) A > B > C

423. A solution contains Cr^{+3}, Cr^{+2} and I^- ions. This solution was treated with iodine at 35°C. E° for Cr^{+3}/Cr^{+2} is –0.41V and E° for I_2/I^- 0.536V. The favourable redox reaction is
(1) Cr^{+2} will be oxidised to Cr^{+3}
(2) Cr^{+3} will reduced to Cr
(3) There will be no redox reaction
(4) I^- will oxidised to I_2

424 Limiting molar conductivity of CH_3COOH (i.e. $\Lambda^\circ_{m(CH_3COOH)}$) is equal to
(1) $\Lambda^\circ_{m(CH_3COOH)} + \Lambda^\circ_{m(HCl)} - \Lambda_{m(NaCl)}$
(2) $\Lambda_{m(CH_3COONa)} + \Lambda_{m(HCl)} - \Lambda^\circ_{m(NaCl)}$
(3) $\Lambda^\circ_{m(CH_3COONa)} - \Lambda_{m(NaCl)} + \Lambda_{m(HCl)}$
(4) $\Lambda^\circ_{m(NaCl)} + \Lambda^\circ_{m(HCl)} - \Lambda_{m(CH_3COOH)}$

425. (a) $H_2O_2 + O_3 \rightarrow H_2O + 2O_2$
(b) $H_2O_2 + Ag_2O \rightarrow 2Ag + H_2O + O_2$
Role of hydrogen peroxide in the above reaction is respectively
(1) Oxidising in (a) and reducing in (b)
(2) Reducing in (a) and oxidising in (b)
(3) Reducing in (a) and (b)
(4) Oxidising in (a) and (b)

426. The weight of copper (At wt=63.5) displaced by a quantity of electricity which displaces 5600 ml of O_2 at STP will be :-
(1) 63.5 g (2) 31.5 g
(3) 15.875 g (4) 127 g

427. When 0.1 mole $Cr_2O_7^{-2}$ is oxidised then quantity of electricity required to completely oxidise $Cr_2O_7^{-2}$ to Cr^{+3} is :-
(1) 9650 C (2) 96500 C
(3) 57900 C (4) 54900 C

428. A device that converts energy of combustion of fuel like hydrogen and methane directly into electrical energy is known as :-
(1) Electrolytic cell (2) Dynamo
(3) Ni-Cd cell (4) Fuel cell

429. Aqueous solution of which of the following compounds is the best conductor of electric current :-
(1) CH_3COOH (2) $C_{12}H_{22}O_{11}$
(3) $H_2C_2O_4$ (4) NaOH

430. The pressure of H_2 required to make the potential of H_2-electrode zero in pure water at 50°C is :-
(1) 10^{-14} (2) 10^{-7}
(3) 10^{+14} (4) 10^{+7}

431. The number of electrons delivered at the cathode during electrolysis by a current of 2 ampere in 120 seconds is (charge on electon = 1.6×10^{-19} C) :-
(1) 3.75×10^{20} (2) 7.48×10^{20}
(3) 1.5×10^{25} (4) 3×10^{20}

432. The molar conductivity of a 0.1 mol/dm^3 solution of KNO_3 with electrolytic conductivity of 4×10^{-3} Scm^{-1} at 298 K is :
(1) 11.52 Scm^2 mol^{-1}
(2) 20 Scm^2 mol^{-1}
(3) 40 Scm^2 mol^{-1}
(4) 13.48 Scm^2 mol^{-1}

433. The resistance of conductivity cell containing 0.001 M KCl solution at 298 K is 1500 ohm. What is the cell constant if the conductivity of 0.001 M KCl solution at 298 K is 0.146×10^{-3} S cm^{-1}
(1) 0.419 cm^{-1} (2) 0.219 cm^{-1}
(3) 0.45 cm^{-1} (4) 0.75 cm

434. Calculate the ΔG° of the following reaction
$Fe^{+2}(aq) + Ag^+(aq) \rightarrow Fe^{+3}(aq) + Ag(s)$
$E^\circ_{Ag^+/Ag} = 0.8V$ $E^\circ_{Fe^{+3}/Fe^{+2}} = 0.77V$
(1) –2895 J mol^{-1} (2) 3845 J mol^{-1}
(3) –1874 J mol^{-1} (4) 325 J mol^{-1}

435. Calculate the emf of the cell
$Fe(s) + 2H^+(1M) \rightarrow Fe^{+2}(0.001M) + H_2(g)\ 1atm$
(Given : $E^\circ_{Fe^{+2}/Fe} = -0.44V$)
(1) 0.215 V (2) 0.38 V
(3) –0.48V (4) 0.3515 V

436. A solution of $CuSO_4$ is electrolysed for 10 minutes with a current of 1.5 amperes. What is the mass of copper deposited at the cathode ?
(Molar mass of Cu = 63.5 g/mol)
(1) 0.492g (2) 0.325g
(3) 0.873g (4) 0.296g

437. The conductance is the :-
(1) Reciprocal of specific resistance
(2) Reciprocal of resistance
(3) Reciprocal of current
(4) Reciprocal of concentration

438. The ion which has lowest ionic mobility in aqueous solution :-
(1) Li^+ (2) Na^+
(3) K^+ (4) Rb^+

439. Metals have conductivity in the order of (ohm^{-1} cm^{-1}) :-
(1) 10^{12} (2) 10^8
(3) 10^2 (4) 10^{-6}

440. Zn can displace :-
(1) Mg^{+2} from its aqueous solution
(2) Cu^{+2} from its aqueous solution
(3) Na^+ from its aqueous solution
(4) Al^{+3} from its aqueous solution

441. Which of the following is incorrect regarding salt bridge solution ?
(1) Solution must be strong electrolyte
(2) Solution should be inert towards both electrodes
(3) Size of cation and anions of salt should be much different
(4) Salt bridge solution is prepared in gelatin or agar-agar to make it semi solid

442. Cell reaction during discharging of lead storage battery at cathode is
(1) $Pb+SO_4^{-2} - 2e^- \rightarrow PbSO_4$
(2) $PbSO_4 + 2e^- \rightarrow Pb+SO_4^{-2}$
(3) $PbO_2 + SO_4^{-2} + 4H^+ + 2e^- \rightarrow PbSO_4 + 2H_2O$
(4) $PbSO_4 + 2H_2O \rightarrow PbO_2 + SO_4^{-2} + 4H^+ + 2e^-$

443. The efficiency of fuel cell is given by :-
(1) $\frac{\Delta G}{\Delta S}$ (2) $\frac{\Delta G}{\Delta H}$ (3) $\frac{\Delta S}{\Delta G}$ (4) $\frac{\Delta H}{\Delta G}$

444. In electrolysis of NaCl when Pt electrode is taken then H_2 is liberated at cathode while with Hg cathode it forms sodium amalgam
(1) Hg is more inert than Pt
(2) Na is dissolved in Hg while it does not dissolve in Pt
(3) More voltage is required to reduce H^+ at Hg than at Pt
(4) Concentration of H^+ ions is larger when Pt electrode is taken

445. The minimum equivalent conductance in fused state is shown by :-
(1) $MgCl_2$ (2) $BeCl_2$
(3) $CaCl_2$ (4) $SrCl_2$

446. The metal that cannot be produced on reduction of its oxide by aluminium is :
(1) K (2) Mn (3) Cr (4) Fe

447. Rust is a mixture of :-
(1) FeO , $Fe(OH)_2$ (2) FeO, $Fe(OH)_3$
(3) Fe_2O_3, $Fe(OH)_3$ (4) Fe_3O_4, $Fe(OH)_3$

448. Which metal will dissolve if the cell works $Cu|Cu^{2+} \| Ag^+ | Ag$ -
(1) Cu (2) Ag
(3) Both A & B (4) None of these

449. The approximate emf of a dry cell is
(1) 2V (2) 1.2V (3) 6V (4) 1.5V

450. When lead storage battery is charged it acts as
(1) Fuel cell (2) Electrolytic cell
(3) Galvanic cell (4) Concentration cell

451. The zinc acts as sacrificial or cathodic protection to prevent rusting of iron because
(1) E°_{red} of Zn > E°_{red} of Fe
(2) E°_{red} of Zn > E°_{red} of Fe
(3) E°_{red} of Zn < E°_{red} of Fe
(4) Zn is cheaper than Fe

452. The molar conductivity of 0.01 M solution of weak acid is 16.6 Ω^{-1} cm^2 mol^{-1}. Its molar conductivity at infinite dilution is 390.7 Ω^{-1} cm^2 mol^{-1}. The degree of dissociation of weak acid is
(1) 0.24 (2) 0.42 (3) 0.042 (4) 0.024

453. The strongest oxidising agent among the species having SRP values of In^{+3} ($E^0 = -1.34$ V), Au^{+3} ($E^0 = 1.4$V), Hg^{+2} ($E^0 = 0.86$ V) and Cr^{+3} ($E^0 = -0.74$V) is
(1) Cr^{+3} (2) Au^{+3} (3) Hg^{+2} (4) In^{+3}

454. Given the standard electrode potential
(a) $K^+/K = -3.02$ V
(b) $Cu^{+2}/Cu = +0.34$ V
(c) $Hg^{+2}/Hg = 0.92$ V
(d) $Cr^{+3}/Cr = -0.74$ V
Decreasing order of reducing power of these element is
(1) a > b > c > d (2) a > d > c > b
(3) a > d > b > c (4) c > b > d > a

455. Calculate E_{cell} of the reaction
$Mg(s) + 2Ag^+ \rightarrow Mg^{+2} + 2Ag(s)$
(0.0001M) (0.100M)
If $E^0_{cell} = 3.17$ V
(1) -2.96 V (2) +2.96V
(3) 3.38 V (4) - 3.38 V

456. Which of the following statements is correct for an electrolytic cell?
(1) electrons flow from cathode to anode through external battery
(2) electrons flow from cathode to anode within the electrolytic solution
(3) Migration of ions along with oxidation reaction at cathode and reduction reaction at anode
(4) migration of ions along with reduction reaction at cathode and oxidation reaction at anode

457 In an electrolysis of acidulated water 4.48 L of hydrogen at STP was produced by passing a current of 2.14 A. For how many hours was the current passed?
(1) 4 (2) 3
(3) 6 (4) 5

458 When a dilute aqueous solution of Li_2SO_4 is electrolysed the products formed at the anode and cathode are respectively?
(1) H and O (2) O_2 and Li
(3) SO_4 and H (4) O_2 and H_2

459 Based on the data given below the correct order of reducing power is
$Fe^{3+}(aq) + e^- \rightarrow Fe^{2+}(aq)$ $E^0 = +0.77$ V
$Al^{3+}(aq) + 3e^- \rightarrow Al(s)$ $E^0 = -1.66$ V
$Br_2(aq) + 2e^- \rightarrow 2Br^-(aq)$ $E^0 = +1.08$ V
(1) $Br^- < Fe^{2+} < Al$
(2) $Fe^{2+} < Al < Br^-$
(3) $Al < Br^- < Fe^{2+}$
(4) $Al < Fe^{2+} < Br^-$

460 How much time is required for complete decomposition of 4 mol water using current of 4 Ampere?
(1) 96500 sec (2) 3.85×10^5 sec
(3) 1.93×10^5 sec (4) 2.92×10^5 sec

461 The amount of metal deposited at cathode on passing electric current of 0.75 ampere in aqueous ferric sulphate solution for 30 minutes. will be (atomic weight of Fe = 56,
(1) 0.00435 g (2) 0.26 g
(3) 0.783 g (4) 0.522g

462 Pt |H (1atm),H (0.001M) |H (0.1M)|H (1atm)|Pt
what will be the value of E_{cell} for this cell
(1) 0.1182 V (2) - 0.1182 V
(3) 0.0591 V (4) - 0.0591 V

463 Consider the following electrode potentials
$Mg^{2+} + 2e^- \rightarrow Mg$ $E^0 = -2.37$V
$V^{2+} + 2e^- \rightarrow V$ $E^0 = -1.18$ V
$Cu^{2+} + e^- \rightarrow Cu$ $E^0 = 0.15$ V
Which of the following reactions will proceed from left to right spontaneously?
(1) $Mg^{2+} + V \rightarrow Mg + V^{2+}$
(2) $Mg + 2Cu^+ \rightarrow Mg+2Cu^{2+}$
(3) $V^{2+} + 2Cu \rightarrow V + 2Cu^+$
(4) $V + 2Cu^{2+} \rightarrow V^{2+} + 2Cu$

464 A metal bucket is to be electroplated by using $ZnCl_2$ as an electrolyte. How many moles of zinc are deposited in 20 min by a constant current of 10A?
(1) 0.01 (2) 0.03 (3) 0.06 (4) 0.10

465 The quantity of electricity required to liberate 112 cm^3 of hydrogen at STP from acidified water is
(1) 0.1F (2) 1F (3) 965C (4) 9650C

466 If $E^0_{Au^{3+}/Au} = 1.69$V and $E^0_{Au^{+}/Au} = 1.40$V then the value of $E^0_{Au^{3+}/Au^{+}}$ will be
(1) 0.19V (2) 2.945 V
(3) 1.255 V (4) 1.19 V

SURFACE

467 Bredig arc method cannot be used to prepare colloidal solution of which of the following
(1) Pt (2) Ag (3) Au (4) Fe

468 Which one of the following is correctly matched
(1) Emulsion - curd (2) Foam - mist
(3) Aerosol - smoke (4) Solid sol - cake

469. The protecting power of lyophilic colloidal sol is expressed in terms of -
(1) Coagulation value
(2) Gold number
(3) Critical micelle concentration
(4) Oxidation number

470 According to freundlich adsorption isotherm which of the following is correct ?
(1) $\frac{x}{m} \propto p^0$
(2) $\frac{x}{m} \propto p^{1/n}$
(3) $\frac{x}{m} \propto p^1$
(4) All the above are correct for different pressure range

471 Among the electrolytes Na_2SO_4, CaCl, $Al_2(SO_4)_3$, and NH_4Cl, the most effective coagulating agent for Sb_2S_3 sol is
(1) Na_2SO_4 (2) CaCl
(3) $Al_2(SO_4)_3$ (4) NH_4Cl

472. A plot of log x/m versus log P for the adsorption of a gas on a solid gives a straight line with slope equal to
(1) 1/n (2) log K (3) – log K (4) n

473. In petrochemical industry alcohols are directly converted to gasoline by passing over heated
(1) Platinum (2) ZSM–5
(3) Iron (4) Nickel

474. Which of the following is not a characteristic of chemisorption -
(1) Adsorption is irreversible
(2) ΔH is of the order of 40 KJ
(3) Adsorption is specific
(4) Adsorption increases with increase of surface area

475. Which of the following is an emulsifier ?
(1) soap (2) water
(3) oil (4) NaCl

476. Gold numbers of protective colloids A,B,C and D are 0.50, 0.01, 0.1 and 0.005 respectively. The correct order of their protective power is
(1) A < C < B < D (2) D < A < C < B
(3) C < B < D < A (4) B < D < A < C

477. The process which is catalysed by one of the product is called -
(1) Positive catalysis
(2) Negative catalysis
(3) Autocatalysis
(4) None of these

478. Match the column :-

X[Colloids]	Y[Classification]
I Smoke	A Sol
II Gelatin	B Aerosol
III Soap lather	C Emulsion
IV Milk	D Foam

	I	II	III	IV
(1)	A	B	C	D
(2)	A	C	B	D
(3)	B	A	D	C
(4)	B	A	C	D

479. Some of the following are true solutions -
I urea solution II Gelation
II Glucose solution V NaCl solution
V Butter VI Blood
Select true solution
(1) I, II V (2) II, II, IV V
(3) , IV V (4) I IV, VI

480. A freshly prepared $Fe(OH)_3$ precipitate is peptized by adding $FeCl_3$ solutions. The charge on the colloidal particles is due to preferential adsorption of
(1) Cl ions
(2) Fe ions
(3) OH ions
(4) None of these

481. Match the column -

	Column-I		Column-II
A	Chemisorption	P	Not specific and decrease with temperature
B	Physisorption	Q	Specific and increases with temperature
C	Desorption of a solute on liquid surface	R	Increases the surface tension of the liquid
D	Adsorption of a solute on a liquid surface	S	Decreases the surface tension of the liquid

	A	B	C	D
(1)	Q	P	R	S
(2)	P	Q	R	S
(3)	S	R	Q	P
(4)	Q	S	P	R

482

	Column-I		Column-II
A	Liquid dispersed in gas	P	Foam
B	Gas dispersed in liquid	Q	Emulsion
C	Liquid dispersed in solid	R	Aerosol
D	Liquid dispersed in liquid	S	Gel

	A	B	C	D
(1)	R	P	S	Q
(2)	P	Q	R	S
(3)	S	R	Q	P
(4)	Q	R	P	S

483.

	Column-I		Column-II
A	Coagulation	P	Due to presence of charge
B	Electrophoresis	Q	Due to scattering of light
C	Tyndall effect	R	Due to neutralization of charge
D	Brownian movement	S	Due to impact of the molecules of the dispersion medium with colloidal particles

	A	B	C	D
(1)	R	P	Q	S
(2)	P	Q	R	S
(3)	S	Q	P	R
(4)	S	P	Q	R

484 Which property of colloids is not dependent on the charge on colloidal particles :-

(1) Electro osmosis (2) Tyndall effect

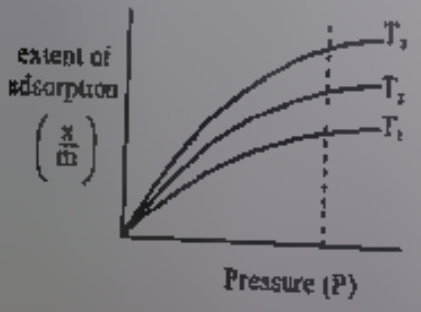
(3) Coagulation (4) Electrophoresis

485 For the coagulation of 50 ml of ferric hydroxide sol 10 ml of 0.5 M KCl is required. What is the coagulation value of KCl ?

(1) 5 (2) 10

(3) 100 (4) None of these

486. For the graph below select correct order of temperture :-



(1) $T_1 > T_2 > T_3$

(2) $T_2 > T_3 > T_1$

(3) $T_3 > T_2 > T_1$

(4) $T_1 = T_2 = T_3$

487 Which of the following is true in respect of chemical adsorption ?

(1) $\Delta H < 0, \Delta S > 0 \quad \Delta G > 0$

(2) $\Delta H < 0, \Delta S < 0 \quad \Delta G < 0$

(3) $\Delta H > 0, \Delta S > 0 \quad \Delta G > 0$

(4) $\Delta H > 0, \Delta S < 0 \quad \Delta G > 0$

488 Which of the following is negatively charged sol

(1) Metallic sulphides

(2) Pt

(3) Acid dye

(4) All of these

489. In freundlich adsorption isotherm the value of 1/n is :-

(1) 1 in case of physical adsorption

(2) 1 in case of chemisorption

(3) Between 0 and 1 in all cases

(4) Between 2 and 4 in all cases

490. The Langmuir adsorption isotherm is deduced using the assumption :-

(1) The adsorption sites are equivalent in their ability to adsorb the particles

2) The heat of adsorption varies with adsorption

(3) The adsorption molecule interact with each other

(4) The adsorption takes place in multilayers

491. Which of the following factors affects the adsorption of a gas on solid ?

(1) Critical temperature (T_c)

(2) Temperature of gas

(3) Pressure of gas

(4) All of these

492. As the temperature of the solid surface increases, the extent of physisorption of a gas

(1) increases

(2) decreases

(3) first increases then decreases

(4) remains unchaged

493. Match the expression given in the column I with the graphs or statement given in the column II and select the correct option from the codes given below

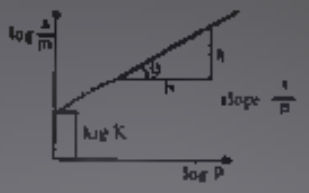
Column I

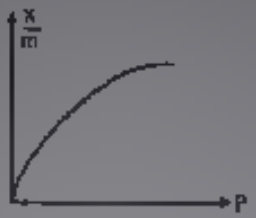
(A) $\frac{x}{m}$ v/s P

(B) $\log \frac{x}{m}$ v/s log P

(C) $\frac{x}{m} = KC^{1/n}$

Column II

(P) 

(Q) 

(R) Adsorption from solution phase

Codes	A	B	C
(1)	P	Q	R
(2)	Q	P	R
(3)	R	P	Q
(4)	R	Q	P

494. Which of the following is purification method of colloidal solution?
(1) Coagulation (2) Ultrafiltration
(3) Electroprocess (4) Tyndal effect

495. Which of the following statements is incorrect regarding physisorption
(1) It occurs because of van der Waal's force
(2) easily liquefiable gases are adsorbed readily
(3) under high pressure it results into multilayered adsorption on adsorbent surface
(4) Enthalpy of adsorption is low and positive

496. When the temperature is lowered and pressure is raised, the adsorption of a gas on a solid
(1) decreases
(2) increases
(3) remains unaffected
(4) decreases first then increases

497. The heat evolved in physisorption is in the range (in kJ/mol) of
(1) 20-40 (2) 40-100
(3) 100-200 (4) 200-400

PHYSICAL CHEMISTRY

Que.							8	9	10	11	12	13	14	15
Ans.	3	1	2	2	2	2	1	4	3	2	1	1	1	3	1
Que.								23	24	25	26	27	28	29	30
Ans.	4	1	3	3	1	3	4	4	2	2	3	1	2	3	1
Que.							37	38	39	40	41	42	43	44	45
Ans.	2	2	2	1		1	4	4	4	1	1	2	1	2	2
Que.	46.				50.		52	53	54	55	56	57	58	59	60
Ans.	3	2	2	4	4	1	2	3	4	1	2	3	4	4	1
Que.				64	65		67	68	69	70	71	72	73	74	75
Ans.	1	4	4	3	2	3	3	1	2	1	3	1	2	2	1
Que.								83	84	85	86	87	88	89	90
Ans.	3	1	3	1	2	4	3	3	2	1	3	4	1	1	2
Que.							97	98	99	100	101	102	103	104	105
Ans.	2	3	3	3	2	3	4	3	3	3	4	2	3	2	2
Que.									114	115	116	117	118	119	120
Ans.	2	3	4	2	1	1	1	2	3	4	3	4	3	4	3
Que.								128	129	130	131	132	133	134	135
Ans.	2	1	2	1	3	3	3	3	2	1	4	2	2	1	2
Que.								143	144	145	146	147	148	149	150
Ans.	4	3	4	4	4	1	2	3	4	1	2	3	1	3	2
Que.								158	159	160	161	162	163	164	165
Ans.	1	1	1	1	1	3	1	3	4	1	4	4	1	2	3
Que.								173	174	175	176	177	178	179	180
Ans.	4	3	1	4	4	2	2	2	3	4	3	3	1	2	1
Que.								188	189	190	191	192	193	194	195
Ans.	2	1	2	2	1	1	3	3	3	4	3	3	1	2	2
Que.									201	202	203	204	205	206	207
Ans.	4	2	1	2	4	3	3	2	4	2	2	2	3	4	1
Que.									216	217	218	219	220	221	222
Ans.	2	4	1	2	1	3	2	1	1	2	1	2	3	3	2
Que.									231	232	233	234	235	236	237
Ans.	2	3	1	3	3	4	4	2	1	1	3	4	4	2	3
Que.															
Ans.	4	1	2	1	1	3	2	3	2	2	3	2	4	1	3
Que.															
Ans.	4	1	3	1	3	3	1	2	4	3	4	2	1	1	4
Que.															
Ans.	3	1	4	2	1	3	4	3	3	2	3	1	4	1	1
Que.															
Ans.	2	4	4	2	2	3	2	2	2	2	4	4	3	3	3
Que.															
Ans.	3	4	4	2	1	3	4	2	3	4	2	3	4	4	4
Que.															
Ans.	2	2	3	4	2	3	2	2	2	1	3	4	3	1	2
Que.															
Ans.	1	2	4	3	3	2	4	3	4	2	3	1	1	1	1

Que.	346	347	348	349	350	351	352	353	354	355	356	357	358	359	360
Ans	3	2	2	3	1	4	3	1	4	1	2	3	2	2	1
Que.	361	362	363	364	365	366	367	368	369	370	371	372	373	374	375
Ans	3	2	1	1	2	1	4	4	1	3	3	1	2	2	2
Que.	376	377	378	379	380	381	382	383	384	385	386	387	388	389	390
Ans	1	1	3	4	1	2	2	1	4	2	2	4	1	3	3
Que.	391	392	393	394	395	396	397	398	399	400	401	402	403	404	405
Ans	2	4	3	2	2	3	1	1	3	1	2	1	2	2	3
Que.	406	407	408	409	410	411	412	413	414	415	416	417	418	419	420
Ans	4	2	2	2	4	3	4	2	1	2	2	2	2	1	1
Que.	421	422	423	424	425	426	427	428	429	430	431	432	433	434	435
Ans	1	3	1	2	3	2	3	4	4	1	3	3	2	1	1
Que.	436	437	438	439	440	441	442	443	444	445	446	447	448	449	450
Ans	4	2	1	2	2	3	3	2	3	2	1	3	1	4	2
Que.	451	452	453	454	455	456	457	458	459	460	461	462	463	464	465
Ans	2	3	2	3	2	4	4	4	1	3	2	1	4	3	3
Que.	466	467	468	469	470	471	472	473	474	475	476	477	478	479	480
Ans	3	4	3	2	4	3	1	2	2	1	1	3	3	1	2
Que.	481	482	483	484	485	486	487	488	489	490	491	492	493	494	495
Ans	1	1	1	2	3	1	2	4	3	1	4	2	2	2	4
Que.	496	497													
Ans	2	1													

PHYSICAL CHEMISTRY

MOLE CONCEPT

1 Neutrons in 1 molecule of H_2O = 8

no. of moles in 1.8 ml = $\frac{1.8}{18}$ = 0.1

no. of molecules = $0.1 \times N_A$

no. of neutrons = $8 \times 0.1 \times N_A$

no. of moles of neutrons = $\frac{8 \times 0.1 \times N_A}{N_A} = 0.8$

2 $PV = nRT$

$\frac{2 \times 350}{1000} = \frac{1}{Mw} \times 0.082 \times 273$

$Mw = 32$

wt of 1 molecule of diatomic molecule $A_2 = \frac{32}{N_A}$

wt of 1 atom of diatomic molecule

$$A_2 = \frac{32}{N_A} \times \frac{1}{2} \quad \frac{16}{N_A}$$

3 for unknown hydrocarbon

$$C_xH_y + \left(x + \frac{y}{4}\right)O_2 \rightarrow xCO_2 + \frac{y}{2}H_2O$$

1 mL	x mL	$\frac{y}{2}$ mL
10 mL	10x mL	$10\frac{y}{2}$ mL

$10x = 20$ and $10\frac{y}{2} = 30$ Hence formula is C_2H_6

$x = 2$ $y = 6$

4 $A + 2B \rightarrow C$

Hence B is limiting reagent

2 mole B produce 1 mole C

and 8 mole B produce 4 mole C

5 1 a.m.u = $\frac{1}{12}$ × wt of C-12 isotope

1 a.m.u = $\frac{1}{24}$ × wt of C 12 isotope

1 amu = 2 × 1 amu'

New amu' = $\frac{\text{amu}}{2}$

Hence to maintain the weight of 1 mole of substance Avogadro constant gets doubled

Let abundance of B-10 be x and B-11 be 100-x

Avg mass =

$$\frac{M_1x_1 + M_2x_2}{x_1 + x_2} \Rightarrow \frac{(10 \times x) + [11 \times (100 - x)]}{100} = 10.8$$

$\Rightarrow x = 20$

7

Atom	atomic mass	% wt	% / Atomic wt.	simplest
C	12	54.54	4.54	2
H	1	9.09	9.09	4
O	16	36.37	2.27	1

Empirical formula = C_2H_4O

Empirical formula weight = 44

Molecular formula weight = 88 × 2 = 176

$$n = \frac{176}{44} = 4$$

Hence molecular formula = $C_8H_{16}O_4$

8. Formula = $X\frac{76}{75}Y\frac{24}{16}$

$= X_2Y_3$

9. $CaCO_3 \rightarrow CaO + CO_2$

100 g 56 g 44g

wt of pure limestone = $\frac{20 \times 40}{100} = 8$gm

100 gm pure $CaCO_3$ produce → 44g CO_2

8 g pure $CaCO_3$ produce → 3.52 g CO_2

10. $CaCO_3 + H_2SO_4 \rightarrow CaSO_4 + H_2O + CO_2$

100 g 98g

100 g $CaCO_3$ require 98 gm H_2SO_4

25 g $CaCO_3$ require $\frac{98}{100} \times 25$ gm pure H_2SO_4

= 24.5 g pure H_2SO_4

Hence wt of 50% pure H_2SO_4 will be 49.5 gm

11 $2H_2 + O_2 \rightarrow 2H_2O$

4gm 32 gm 36gm

given 8gm 32 gm

Hence O_2 is limiting reagent

12 $\%\ wt = \frac{Atomic \times Atomicwt}{molecular\ wt} \times 100$

If minimum molecular wt is to be found then take atomicity = 1

$$3.4 = \frac{1 \times 32 \times 100}{min\ \ molecular\ wt}$$

$\Rightarrow$ Minimum molecular wt = 941.176

13. (i) No. of molecules = $\frac{15}{22.4} \times N_A$

(ii) No. of molecules = $\frac{5}{22.4} \times N_A$

(iii) No. of molecules = $\frac{0.5}{2} \times N_A$

(iv) No. of molecules = $\frac{10}{32} \times N_A$

Hence 15 L H_2 will have maximum number of molecules

14 Weight of metal chloride = x

weight of metal = y

weight of chlorine = x–y

$$Equivalent\ weight = \frac{weight\ of\ metal}{weight\ of\ chlorine} \times 35.5$$

$$= \frac{y}{(x-y)} \times 35.5$$

15 Let the mass be 100 gm

Ratio of moles = Ratio of volumes

$$= \frac{100}{2} : \frac{100}{28} = \frac{100}{16}$$

= 56 : 4 : 7

16 $H_2 + Cl_2 \longrightarrow 2HCl$ $n_{HCl} = \frac{3.65}{36.5} = 0.1$

2gm 71 gm 73 gm

1mole 1mole 2mole

here 2 mole HCl produced by 1 mole H_2

1 mole HCl produce by 0.05 mole H_2

$n_{H_2} = n_{Cl_2} = 0.05$

$V_{H_2} = V_{Cl_2} = 0.05 \times 22.4 = 1.12$ L

17 Weight of

(1) 1g-atom of C=12 g

(2) $\frac{1}{2}$ mole CH_4 = 8g

(3) 10 ml water = 10 gm

(4) 3.01×10^{23} atom of oxygen = 8 gm

hence mass is highest in 1g-atom of C

18 $2CO + O_2 \rightarrow 2CO_2$

2L 1L 2L at constant temperature

4L 2L 2L

Hence 4L CO require 2L O_2

19 Molar wt = 2 × VD and x(12 + 16) = 140

$= 2 \times 70$ $x = \frac{140}{28} = 5$

= 140

20 mass of 1L CO_2 = mass of 12 hydrocarbon

mass of 22.4L CO_2 = mass of 22.4L hydrocarbon

44 g = mass of 22.4 C hydrocarbon

mass of 1 mole hydrocarbon = 44 gm

Here C_3H_8 has molar mass 44 gm.

21 At same temperature and pressure same volume and same moles are contained

Ratio of moles $^nH_2$ ^nH_e $^nO_2$ $^nO_3$

1 1 1 1

Ratio of No. of atoms H_2 He O_2 O_3

2 1 2 3

22 In I oxide

50 gm O combine with 50 gm S

1 gm O combine with 1gm S

In II oxide

60 gm O combine with 40 gm S

1 gm O combine with $\frac{2}{3}$ gm S

Ratio in which 1 gm O combine with different masses of sulphur 3 : 2

23

N	$\frac{2.314}{14} = 0.165$	$\frac{0.165}{0.165} = 1$
O	$\frac{5.34}{16} = 0.333$	$\frac{0.333}{0.165} = 2$

Empirical formula = NO_2

24. $CO_2(g) + C(s) \longrightarrow 2CO(g)$
1cc of CO_2 produce 2cc of CO
16 cc of CO_2 produce 32 cc of CO

25 $C_xH_y + \left(x + \frac{y}{4}\right)O_2 \rightarrow xCO_2 + \frac{y}{2}H_2O$

1mL xmL $\frac{y}{2}$ mL

500 mL 500 xmL 250 ymL

Hence, and

500 x = 2000 250 y = 2500 mL

x = 4 y = 10 mL

formula = C_4H_{10}

26 1 mol $Ba(NO_3)_2$ contain $\rightarrow$ 3 mole ions

$n_{Ba(NO_3)_2} = \frac{0.1 \times 1}{1000} = 10^{-4}$

No. of ions = $3 \times 10^{-4} \times 6.02 \times 10^{23}$
$= 3 \times 6.02 \times 10^{19}$

27 1 gm equivalent of O = 8 gm
Hence
0.25 mole O_2 contain 8 gm oxygen

29 8 mole O contained by $\rightarrow$ 1 mole $Mg_3(PO_4)_2$

1 mole O contained $\frac{1}{8}$ mole $Mg_3(PO_4)_2$

by

0.25 mole O is $\Rightarrow \frac{1}{8} \times 0.25$ mole $Mg_3(PO_4)_2$

contained by = 3.125×10^{-2} mole $Mg_3(PO_4)_2$

30 $MnO_2 + 4HCl \rightarrow MnCl_2 + Cl_2 + 2H_2O$ $^nCl_2 = \frac{2.24}{22.4}$

1mole 1mole

87 gm 1mole =0.1 mole

1 mole Cl produced by 87 gm pure MnO_2

0.1 mole Cl_2 produced by 8.7 gm pure MnO_2

% purity = $\frac{8.7}{10} \times 100 = 87\%$

% impurity = 13%

ATOMIC STRUCTURE

42 E = nhν
$= 6.023 \times 10^{23} \times 6.62 \times 10^{-34} \times 909 \times 10^{1}$
$= 3.62 \times 10^{4}$ J

43 $\lambda = \frac{h}{\sqrt{2 \times K \times E \times m}}$

$= \frac{6.63 \times 10^{-34}}{\sqrt{2 \times K \times 1 \times 1.67 \times 10^{-27}}}$

$= \frac{6.62 \times 10^{-34}}{\sqrt{2 \times \frac{R}{N_A} \times 300 \times 1.67 \times 10^{-27}}}$

= 178 pm

44 $\upsilon = \frac{C}{\lambda} = \frac{C}{\frac{h}{p}} = \frac{pC}{h} = \frac{2KE}{h}$ (P is momentum)

45 $\frac{E_1}{E_2} = \frac{Z_1^2}{Z_2^2} \times \frac{n_2^2}{n_1^2}$

$\frac{(-19.6 \times 10^{-18})}{E_2} = \frac{2^2}{3^2} \times \frac{1^2}{1^2}$

$E_2 = -4.41 \times 10^{-17}$ J atom^{-1}

47 PE = 2 TE × Z^2
$= 2 \times (-3.4) \times 2^2$
$= -27.2$ eV

48 $2\pi r = n\lambda$
$2\pi(9X) = 3\lambda$
$= 6\pi X$

49. $mvr = n\frac{h}{2\pi}$

$= \frac{5h}{2\pi}$

$= 2.5\frac{h}{\pi}$

50 $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 4s^2\ 3d^6$

52. $\lambda = \frac{h}{mv}$

53 $\ell = 2 \Rightarrow$ d subshell
5 orbitals

55 $E_2 = -3.4$ eV
$= -3.4 \times 1.6 \times 10^{-19}$ J
$= -5.44 \times 10^{-19}$ J

56 $\Delta X \Delta V = \frac{h}{4\pi m}$

$\Delta V = \frac{0.527 \times 10^{-4}}{5 \times 10^{-5} \times 2 \times 10^{-2}}$

$= 5.2 \times 10^{-1}$

59 $n = 3$

$\ell = 0, 1, 2$

60. $\frac{\lambda_1}{\lambda_2} = \sqrt{\frac{V_2}{V_1}} \quad \sqrt{\frac{100}{400}} \quad \frac{1}{2}$

61 nos of e$^-$ = 2+8 + 8 + 2 = 20

$1s^2 2s^2 2p^6 3s^2 3p^6 4s^2$

$m = 0, s = +\frac{1}{2}$ ⇒ number of e$^-$ = 6

65 Angular momentum = $\sqrt{\ell(\ell+1)}\ \frac{h}{2\pi}$

$\sqrt{6}\ \frac{h}{2\pi}$

67 Magnetic moment = $\sqrt{n(n+2)}$ B.M

$n = 3$

hence Ti^{+}

73 $\lambda = \frac{h}{mv} = \frac{6.62 \times 10^{-34}}{9.1 \times 10^{-31} \times 2.99 \times 10^{8}}$

$= 0.024$ Å

77 $(IE)_H = (E_H) \times Z^2 = 13.6 \times 4 = 54.4$ eV

CHEMICAL EQUILIBRIUM

79 $PCl_5 \rightarrow PCl_3 + Cl_2$

4 0 0

4 − 0.8 0.8 0.8

$K_c = \frac{0.8 \times 0.8}{3.2} \quad 0.2$

80 $K_c = [C_4]^2 [R_4]$ (1)

$K_c = 4 [C]^2 [R]$ (2)

(1) (2) $[R] = \frac{1}{4}[R]$

81 $XY_{(g)} \rightleftharpoons X_{(g)} + Y_{(g)}$

t = 0 1 mole 0.2 mole

at equilibrium 1−x x 0.2+x

∴ 0.2 + x = 0.6

$\boxed{x = 0.4 \text{ mole}}$

$K = \frac{0.6 \times 0.4}{0.6} = 0.4$

83 $K_c = [X^{+2}] [Y^{-1}]$ (1)

$K_c = [X^{+2}] \left\{\frac{1}{2}[Y^{-1}]\right\}^2$ (2)

(1) = (2)

$\frac{1}{8}[X^{+2}] = [X^{+2}]$

$[X^{+2}] = 8[X^{+2}]$

84 $K_c = \frac{(6)^2}{3 \times 6 \times 9} = \frac{2}{9}$

85 $P_{H_2} = \frac{3}{4} \times 2 = \frac{3}{2}$ atm

86 $K_p = K_c(RT)^{\Delta n_g}$ ∵ $\Delta n_g = 0$

$\boxed{K_p = 5}$

87 $K_p = (7.9 \times 10^{-3}) \times (0.0821 \times 115)^{0.5}$

$K_p = 7.56 \times 10^{-1}$

88 $NH_4HS \rightleftharpoons NH_{3(g)} + H_2S_{(g)}$

at equilibrium p p

$P_{eq} = 2P = 0.66$

$\boxed{P = 0.33 \text{ atm}}$

89 $2H_{(g)} \rightleftharpoons H_{2(g)} + I_{2(g)}$

t = 0 1 0 0

t = eq" 1−0.5 0.25 0.25

$K_c = \frac{(0.25)^2}{(0.5)^2} = 0.25$

IONIC EQUILIBRIUM

120. One OH molecule means monobasic base

Like NH_4OH or BOH

$BOH \rightleftharpoons B^+ + OH^-$

$K_h = Ca^2 \Rightarrow Kb$

$K_h = 0.05 \times \left(\frac{2.5}{100}\right)^2 \Rightarrow 3.1 \times 10^{-4}$

121 $Ca_3(PO_4)_2 \rightleftharpoons 3Ca^{+2} + 2PO_4^{-3}$

5 3S 2S

100 ml have = w gm

100 ml have = $\frac{w}{100} \times 1000 = \frac{w \times 10}{M}$ (solubility)

Now Ksp = $[Ca^{+2}]^3 [PO_4^{-3}]^2$

$= \left[\frac{w \times 10 \times 3}{M}\right]^3 \left[\frac{w \times 10 \times 2}{M}\right]^2$

Approx = $10^7 \left(\frac{w}{M}\right)^5$

122 no of mole of Benzoic acid = $\frac{0.2}{122}$

eq of $Ba(OH)_2$ = eq. of C_6H_5COOH

$2 \times \frac{0.1 \times V}{1000} = 1 \times \frac{0.2}{122}$

V = 6.83 ml

123 $Ag_2CrO_4 \rightleftharpoons 2Ag^+ + CrO_4^{-2}$

(25 + 0.1) s

$AgNO_3 \rightarrow Ag^+ + NO_3^-$

0.1 + 25 0.1

Ksp = $[0.1 + 2s]^2 [s]$

$1.1 \times 10^{-12} = (0.1)^2(s)$

$s = 1.1 \times 10^{-10}$ (mole/litre)

124 $A_pB_q \rightleftharpoons pA^{+q} + qB^{-p}$

ps qs

Ksp = $[ps]^p [qs]^q$

$= s^{p+q} p^p q^q$

125 $H_2O \rightleftharpoons H^+ + OH^-$ $[H_2O] = 55.5$

$K = \frac{[H^+][OH^-]}{[H_2O]}$ $[H^+] = [OH^-] = 10^{-7}$

at 25°C

$K = \frac{10^{-7} \times 10^{-7}}{55.5}$

$K = 1.8 \times 10^{-16}$

126 $K = \frac{K_a}{K_w} = 10^{10}$

128 meq of HCl = 0.5 × 25 = 12.5

meq of NaOH = 0.5 × 10 = 5

remaining of HCl in mixture = 7.5

Total volume = 25 + 10 + 15 = 50 ml

$[H^+] = \frac{7.5}{50}$

$pH = -\log \frac{7.5}{50} = 0.82$

129 pOH = log[OH⁻], then pH = 14−pOH

130 $(OH^-) \frac{0.01}{10} = 10^{-3} \Rightarrow pOH \Rightarrow pH = 14 - 3 = 11$

change in pH = 11 − 7 = 4

131 $Ka = C\alpha^2$ $0.1 \times (1.32 \times 10^{-2})^2 = 1.74 \times 10^{-5}$

pKa = 5 log 1.74 = 5 − 0.26

= 4.74

132 $M_1V_1 = M_2V_2$

133 $F^- + H_2O \rightleftharpoons OH^- + HF$

0.01(1 − h) 0.01h 0.01h

135 acidic strength α K_a

136 $\boxed{K_b > K_a}$

137 $Ksp = 4s^3 = 4 \times 10^{-9} \Rightarrow s = 10^{-3}$

138. Ka = Kb = 10^{-5}

For NH_4OH pOH = 3 then pH = 11

139. $BaSO_4 \rightleftharpoons Ba^{+2} + SO_4^{-2}$

10^{-4} x

$Ksp = [10^{-4}][x]$

$4 \times 10^{-10} = 10^{-4} \times x \Rightarrow x = 4 \times 10^{-6}$

140. $S = \frac{mo}{\text{litre}}$

Now in grm/ litre = 5× m. wt

Ksp = $1.56.25 \times 10^{-10}$

$s = 1.25 \times 10^{-5}$ mol/L

$s = 143.5 \times 1.25 \times 10^{-5}$ gm/L

141 $RaSO_4 \rightleftharpoons Ra^{+2} + SO_4^{-2}$

$Na_2SO_4 \rightarrow 2Na^+ + SO_4^{-2}$

0.20 0.10 + s

Ksp [s] [s + 0.10]

$s^2 = 4 \times 10^{-10}$

142 $HSO_4^- \xrightarrow{-H^+} SO_4^{-2}$

$+H^+$ ↓

H_2SO_4

143 $K_2CO_3 + 2H_2O \rightleftharpoons H_2CO_3$

weak acid strong base

144 $AgCl + 2NH_3 \rightarrow [Ag(NH_3)_2]Cl$

145 total $[H^+] = 10^{-8} + 10^{-7}$
$= 10^{-7}[10 + 1]$
$[H^+] = 11 \times 10^{-7}$
$pH = -\log(11 \times 10^{-7})$
$pH = 5.98$

146 $\alpha\sqrt{v}$

147 Amphiprotic acid

$$H_2SeO_3 \underset{}{\overset{Ka_1}{\rightleftharpoons}} HSeO_3^- \overset{Ka_2}{\rightleftharpoons} SeO_3^{2-}$$

$$Ka_1 = \frac{[HSeO_3^-][H^+]}{[H_2SeO_3]}, Ka_2 = \frac{[SeO_3^{2-}][H^+]}{[HSeO_3^-]}$$

$$Ka_1 \times Ka_2 = [H^+]^2 \times \frac{[SeO_3^{2-}]}{[H_2SeO_3]} \quad (1)$$

At isoelectric point, $[SeO_3^{2-}] \approx [H_2SeO_3]$

then from (1),
$Ka_1 \times Ka_2 = [H^+]^2$
$\Rightarrow [H^+] = (Ka_1 \times Ka_2)^{1/2}$
$pH = \log (Ka_1 \times Ka_2)^{1/2}$

$$\Rightarrow \boxed{pH = \frac{1}{2}(pKa_1 + pKa_2)}$$

148. due to odd ion effect

148 Due to higher conc of NaCl reaction goes more backward than $AgNO_3$

150 $Cu(OH)_2 \rightleftharpoons Cu^{++} + 2OH^-$
S 2S

$Ksp = 4S^3$

Now $\begin{bmatrix} 2S = [OH^-] \\ pOH = \log[OH^-] \end{bmatrix}$

$4S^3 = 32 \times 10^{-21}$
$S^3 = 8 \times 10^{-21}$
$S = 2 \times 10^{-7}$
$[OH^-] = 2S = 4 \times 10^{-7}$
$pOH = 7 - \log 4$
$pOH = 7 - 0.6 = 6.4$
$pH = 14 - 6.4 = 7.6$

151 $[H^+] = K_{In} \times \frac{[HIn]}{[In^-]}$

Case I $[H^+]_1 = 3 \times 10^{-5} \times \frac{0.75}{0.25} = 9 \times 10^{-5}$

Case II $[H^+]_2 = 3 \times 10^{-5} \times \frac{0.25}{0.75} = 1 \times 10^{-5}$

Change in $[H^+] = 8 \times 10^{-5}$

152. $\boxed{pH = pKa \pm 1}$

154 Excess of acid entering the blood stream will react with HCO_3^- to produce H_2CO_3 and this newly produced H_2CO_3 will not further dissociate due to common ion effect

155 $\boxed{pKa = -\log Ka}$ & $\boxed{pKb = -\log Kb}$

↑ pKa ⇒ (Acidic strength)

157 meq of HCl = $0.050 \times 20 = 1$
meq of $Ba(OH)_2 = 0.10 \times 2 \times 30 = 6$
meq of $Ba(OH)_2$ Left = $6 - 1 = 5$
total volume = $20 + 30 = 50$ ml

$$[OH^-] = \frac{5}{50} = 0.1$$

158. $Hg_2Cl_2 \rightleftharpoons Hg_2^{+2} + 2Cl^-$
$Ksp = [Hg_2^{+2}][Cl^-]^2 = 4S^3$
$4S^3 = 32 \times 10^{-18}$
$S^3 = 8 \times 10^{-18}$
$S = 2 \times 10^{-6}$ mol/L

161 $K_h = \frac{K_w}{K_b} = \frac{10^{-14}}{10^{-5}} = 10^{-9}$

164 $CH_3NH_2 + HCl \longrightarrow CH_3NH_3Cl$
0.1 0.08 0
0.02 0 0.08 Buffer solution

$$pOH = pK_b + \log\left[\frac{\text{salt}}{\text{Base}}\right]$$

$K_b = 5 \times 10^{-4}$
$pK_b = 4 - \log 5$
$= 4 - 0.7$
$= 3.3$

$= 3.3 + \log \frac{0.08}{0.02}$
$= 3.3 + \log 4$
$= 3.3 + 0.6$
$= 3.9$
$pH = 14 - 3.9 = 10.1$
$[H^+] = \text{Antilog}(-10.1)$
$= 8 \times 10^{-11}$ mol/L

166. Properties of buffer solution is

$$pH = pKa + \log \frac{[Salt]}{[Acid]}$$

$Ka = 1.8 \times 10^{-5}$

$pKa = -\log 1.8$

$= 5 - 0.25$

$= 4.75$

$$pH = 4.75 + \log \frac{0.15}{0.1}$$

$= 4.75 + \log 1.5$

$= 4.75 + 0.5$

$= 4.90$

173 $$pH = 7 + \frac{1}{2}pKa + \frac{1}{2}\log C$$

$$= 7 + 3 - \frac{1}{2} = 9.5$$

174 $CH_3COOH + HCl \rightleftharpoons Cl^- + CH_3COOH_2^+$

WB WA SB SA

175. $pK_b = 4.7$

$K_b = 10 \times 10^{-5}$

$K_h = 2 \times 10^{-9} = C\alpha^2$

$2 \times 10^{-9} = 5 \times 10^{-2} \alpha^2$

$$\alpha = \frac{2 \times 10^{-9}}{5 \times 10^{-2}} = 0.4 \times 10^{-3}$$

$\alpha = 6.32 \times 10^{-4} \times 100 = 0.32\%$

177 $Ksp = [Mg^{2+}][F^-]^2$

$Ksp = (s)(2s + c)^2$

$8 \times 10^{-8} = 5c^2$

$$s = \frac{8 \times 10^{-8}}{4 \times 10^{-2}}$$

$= 2 \times 10^{-6} M$

178 $$pH = 7 + \frac{1}{2}pK_a - \frac{1}{2}pK_b$$

$pH = 7$

179 $Ksp = [Mg^{2+}][OH^-]^2$

$10^{-10} = [10^{-4}][OH^-]^2$

$OH^-_{(aq)} = 10^{-10}$

$[OH^-] = 10^{-5}$

$pOH = 5$

So $pH = 14 - 5 = 9$

180 $$[H_3O^+] = \sqrt{KaC}$$

$$= \sqrt{4 \times 10^{-14} \times 0.25}$$

10^{-7}

181 $$S = \frac{0.46}{245} = 1.87 \times 10^{-3} M$$

$Ksp = 4S^3$

$= 4 \times (1.87 \times 10^{-3})^3$

$Ksp = 2.6 \times 10^{-8}$

182 $Ksp = [Ag^+]^2[CO_3^{2-}]$

$Ag_2CO_3 \rightleftharpoons 2Ag^+ + CO_3^{2-}$

$2S^+ \quad S^+ + 0.1$

$Na_2CO_3 \rightarrow 2Na^+ + CO_3^{2-}$

$4 \times 10^{-11} = (2S^+)^2 (S^+ + c)$

$4 \times 10^{-11} = 4 (S^+)^2 c$

$$S = \sqrt{\frac{10^{-1}}{10}} = 10^{-5}$$

THERMODYNAMICS

186. $H-C\equiv C-H + 2H-H \longrightarrow H-\underset{H}{\overset{H}{C}}-\underset{H}{\overset{H}{C}}-H$

$\Delta H_{rxn} = 2 B.E (C-H) + B.E (C\equiv C) + 2B.E (H-H)$

$-6 B.E (C-H) - B.E (C-C)$

$= B.E (C\equiv C) + 2B.E (H-H) - 4B.E (C-H) - B.E (C-C)$

$= 601 + 2 \times 240 - 4 \times 425 - 340$

$\Delta H_{rxn} = -599 KJ/mol$

189 Δn_g should be greater than 0

190 $$\frac{1}{2}N_2(g) + \frac{3}{2}H_2(g) \longrightarrow NH_3(g)$$

$$\Delta H_{rxn} \quad \Delta_f H(NH_3) = \frac{1}{2} B.E (N\equiv N) + \frac{3}{2} B.E (H-H) - 3B.E (N-H)$$

$$120 = \frac{1}{2} \times 240 + \frac{3}{2} \times 400 - 3B.E (N-H)$$

$B.E (N-H) = 280 KJ/mol$

191 $C(s) + 2H_2(g) \longrightarrow CH_4(g)$, $\Delta H_f(CH_4)$

$\Delta H (CH_4) = (2) + 2 \times (3) \quad (1)$

$= -y + 2(-z) - (x)$

$\Rightarrow x - y - 2z$

192 $$(3) = \frac{1}{2} \times (1) - \frac{1}{2} \times (2)$$

$$= \frac{1}{2} \times (-27.1) - \frac{1}{2}(-53.5)$$

$\Delta H = +40.3 KJ$

193 $CH_4(g) + 2O_2(g) \rightarrow CO_2(g) + 2H_2O(\ell)$

$\Delta H^\circ = \Delta U^\circ + \Delta n_g RT$

$\Delta H^\circ = - x + (-2)\ R \times 298$

$\Delta H^\circ = - x - 596\ R$

194 In the given reaction heat will release in bond formation and randomness decreases.

195. $\Delta G^\circ = -2.303\ RT \log K_{eq}$

$= -2.303 \times 8.314 \times 300 \log 100$ J

$\Delta G^\circ = -11.488$ KJ

196 $H_2O(\ell) \longrightarrow H_2O(g)$

$\Delta H^\circ = \Delta E^\circ + \Delta n_g RT$

$$40.66 = \Delta E^\circ + \frac{1 \times 8.314 \times 373}{1000}$$

$\Delta E^\circ = +37.56$ KJ/mole

for 2 mole $\Delta E^\circ = 2 \times 37.56 = 75.12$ KJ

199 $$\Delta H = 2 + \frac{1 \times 2 \times 300}{1000} = 2.6 \text{ KCal}$$

$\Delta G = \Delta H - T\Delta S$

$$2.6 - \frac{300 \times 50}{1000} = -12.4 \text{ KCal}$$

200 (4) = (1) + (2) - (3)

$\Delta H = 150 + (-125) - 350$

$= -325$ KJ

201 $\Delta H_{vap} = 900 = 6$ BE (N–H)

B.E. (N–H) = 150 Kg

202 $CH_4 + 2O_2 \rightarrow CO_2 + 2H_2O$, $\Delta H = -400$ KJ/mole

for 2 mole or 36 gm water heat released $= -400$ KJ/mole

for 400 gm water heat released will be

$$= \frac{-400}{36} \times 40$$

$= -444.44$ KJ

205 $$W = 2.303\ nRT \log \frac{V_2}{V_1}$$

$$= \frac{2.303 \times 2 \times 8.314 \times 300 \log \frac{40}{4}}{1000} \text{ KJ}$$

$W = -11.224$ KJ

207 $$W = -P(V_2 - V_1) = -PnRT\left(\frac{1}{P_2} - \frac{1}{P}\right)$$

$$W = \frac{1 \times 5 \times 8.314 \times 300\left(\frac{1}{1} - \frac{1}{10}\right)}{1000} \text{ KJ}$$

$W = -11.224$ KJ

212 $H_2O(s) \rightleftharpoons H_2O(\ell)$

$\Delta G = \Delta H - T\Delta S$

$$0 = \Delta H - \frac{273 \times 5.26}{1000}$$

$\Delta H = 1.435$ KCal/mol

214 $\Delta G = \Delta H - T\Delta S < 0$ for spontaneous process

$$T > \frac{\Delta H}{\Delta S}$$

$$T < \frac{-100 \times 10^3}{-100}$$

$T < 1000$ K

215 $2LiOH + H_2SO_4 \rightarrow Li_2SO_4 + 2H_2O$

$$\Delta H_{neut} = -69.6 \text{ KJ/mol} = \frac{2\Delta H_f(LiOH) + 0 - 57.3 \times 2}{2}$$

$\Delta H_f(LiOH) = -22.5$ KJ/mole

217 $$\Delta S_{reac} = 50 - \frac{1}{2} \times 60 - \frac{3}{2} \times 40 = -40\ JK^{-1}mol^{-1}$$

$$T = \frac{\Delta H}{\Delta S} = \frac{-30 \times 10^3}{-40} = 750K$$

218 $\Delta H_{comb} = 4 \times (-393.5) - 4x(-110.5) - 2x(-33.2)$

$\Delta H_{comb} = -1065.5$ KJ

219 18g water = 1 mol water

$H_2O(\ell) \rightleftharpoons H_2O(g)$

$\Delta H = \Delta E + \Delta n_g RT$

$$40.66 = \Delta E + \frac{1 \times 8.314 \times 373}{1000}$$

$\Delta E = 40.66 - 3.1$

$\Delta E = +37.56$ KJ

220 (1) + 2 × (2) – (3)

$\Delta H_f(CH_4) = \Delta H_1 + 2\Delta H_2 - \Delta H_3$

$= -94.2 + 2 \times (-68.3) - (-210.8)$

$= -20$ KCal

223. T.R. $2Al_{(s)} + \frac{3}{2}O_{2(g)} \rightarrow Al_2O_{3(s)}$, $\Delta H = \Delta H_f$

$$\Delta H_f = \frac{-3352}{2} = -1676 \text{ kJ/mol}$$

224. $\Delta G = \Delta H - T\Delta S$

$= (+ve) - (+ve)$

$\Delta G = (+ve) (-ve)$

$\Delta G =$ -ve only at high temp.

226. $\Delta G^\circ = -nFE^\circ$

$-21\ 20 = -1 \times 96500 \times E^\circ$

$$E^\circ = \frac{21\ 20 \times 1000}{96500}$$

$= 0.22V$

227 T R $C_{(s)} + \frac{1}{2}O_{2(g)} \longrightarrow CO_{(g)}$, $\Delta H_r = \Delta H_f$

T R = (I) + (II) rev

$= (-X) + (+Y)$

$\Delta H_r = Y - X$

228. average B.E $= \frac{368}{2} = 184$ kJ/mol^{-1}

REDOX

229. $\overset{+4}{S}O_2 + H_2\overset{-2}{S} \longrightarrow 3\overset{0}{S} + 2H_2O$

230. $Ba^{2+}\ 2(H_2PO_2^-)$

$2 + x - 4 = -1$

$x = +1$

232. Br_2 —Reduction→ $Br^{\ominus}$ (−1); Br_2 —oxidation→ $BrO_3^{\ominus}$ (+5)

235. $MnO_4^- + FeC_2O_4 \longrightarrow Mn^{+2} + Fe^{+3} + CO_2$

Equivalents of MnO_4^- = Equivalents of FeC_2O_4

$x \times 5 = 2 \times 3$

$x = 1.2$ mol

236. $2x + 2x - 14 = 0$

$x = +5$

237. Intermediate oxidation number.

238. $3Fe + 4H_2O \longrightarrow Fe_3O_4 + 8H^+ + 8e^-$

239. $PbO_2 + HNO_3 \longrightarrow Pb(NO_3)_2 + H_2O + \frac{1}{2}O_{2(g)}$

240. Equivalents of $KMnO_4$ = Equivalents of H_2O_2

$1.5 \times 5 = x \times 2$

$$x = \frac{1.5 \times 5}{2} = \frac{15}{4}$$

244. $I_2 + HNO_3 \longrightarrow HIO_3 + NO_2 + H_2O$

Equivalents of I_2 = Equivalents of HNO_3

$$\frac{5}{254} \times 10 = \frac{x}{63} \times 1$$

$x = 12.4$ g

245 $NOClO_4 \rightarrow NO + ClO_4$

ClO_4^-

$x - 8 = -1$

$x = +7$

246 Equivalents of $KMnO_4$ = N × V(L)

$= 0.05 \times 4 = 0.2$

No. of equivalents = moles × n factor

$$\text{moles} = \frac{0.2}{5}$$

$$\text{weight} = \frac{0.2}{5} \times 158 = 6.32 \text{ g}$$

250. Equivalents of I_2 = Equivalents of $S_2O_3^{-2}$

$$\frac{X}{254} \times 2 = N \times V(L)$$

$$\frac{x}{127} = \frac{4}{1000} \times 0.11$$

$x = 0.558$ g

252 $Fe^{+2} + HNO_3 \longrightarrow Fe^{+3} + NO$

Equivalents of Fe^{+2} = Equivalents of HNO_3

$$\frac{8}{56} \times 1 = N \times V(L)$$

$$\frac{8}{56} = (3 \times 3) \times \frac{V(ml)}{1000}$$

$$V(ml) = \frac{8}{9 \times 56} \times 1000 = 15.87 \text{ m}$$

BEHAVIOUR OF GASES

257. $P_1V_1 = P_2V_2$

$$V_2 = \frac{1 \times 2\ 27}{0.2} = 11\ 35$$

so $V < 11.35$

258. $\frac{V_2}{T_2} = \frac{V_1}{T_1}$

$$V_2 = \frac{2 \times 299\ 21}{296.4} = 2\ 01\ L$$

259. $\frac{PV}{T_1} = \frac{P_2V_2}{T_2}$

$P_2 = \frac{500 \times 400}{300} \times \frac{280}{550}$

260 $P_{H_2} = \frac{n_H}{n_{H_2} + n_{CH_4}}$

$P_{H_2} = \frac{5}{\frac{5}{2} + \frac{2}{16}} \times 30$

270 $r_{SO} = \sqrt{2}\, r_0$

$\frac{r_{SO}}{r_0}\sqrt{2} = \sqrt{\frac{M_w}{M_{wSO_2}}} = \sqrt{\frac{M_w}{64}}$

$M_w = 2 \times 64 = 128$

$VD = \frac{Mw}{2} = \frac{128}{2} = 64$

271 $\frac{r_A}{r_B} = \frac{1}{2} = \sqrt{\frac{M_{wB}}{M_{wA}}}$

$\frac{M_{wA}}{M_{wB}} = \frac{4}{1}$

272 $\frac{r_A}{r_B} = \frac{4}{1} \sqrt{\frac{d_B}{d_A}}$

$\frac{d_A}{d_B} = \frac{1}{16}$

SOLID STATE

279. $d = \frac{Z \times M}{a \times N_A}$

$10.3 = \frac{2 \times 96}{a^3 \times 6 \times 10^{23}}$

$a = 3.14 \times 10^{-8}$ cm $= 314$ pm

$r = \frac{\sqrt{3}a}{4} = 135.96$ pm

281 A $\longrightarrow$ corners $= 8 \times \frac{1}{8} = 1$

B $\rightarrow$ at 5 face centers $= 5 \times \frac{1}{2} = \frac{5}{2}$

$A : B = 1 : \frac{5}{2} = 2 : 5$

A_2B_5

284 $\frac{r_{A^+}}{r_{B^+}} = \frac{94}{146} = 0.64$

The radius ratio lies in between 0.414 to 0.732 so, cation should be in octahedral void therefore structure will be Rock salt

285 O^{-2} $\rightarrow$ ccp $\rightarrow 4$

A $\rightarrow \left(\frac{1}{8}\right)^m$ $TV = \frac{1}{8} \times 8 = 1$

B $\rightarrow \left(\frac{1}{4}\right)^m$ $OV = \frac{1}{4} \times 4 = 1$

ABO_3

287 C is present at corners while Cs is present at Body centre, so minimum interatomic distance

$= \frac{\sqrt{3}a}{2} = 3.72$pm

288. $d = \frac{Z \times M}{a^3 \times N}$ M $\rightarrow$ mass of substance, N $\rightarrow$ No of atoms

$N = \frac{2 \times 208}{(288 \times 10^{-10})^3 \times 7.2}$

$= 24 \times 10^{21}$

289 M $\longrightarrow \frac{1}{3}$ of $TV = \frac{1}{3} \times 8 = \frac{8}{3}$

N $\rightarrow$ ccp $\longrightarrow 4$

M : N

$\frac{8}{3} : 4$

$2 : 3 \Rightarrow M_2N_3$

290 $d = \frac{Z \times M}{a^3 \times N_A}$

$M = \frac{d \times a^3 \times N_A}{2} = \frac{8.92 \times (3.6 \times 10^{-8})^3 \times 6 \times 10^{23}}{4}$

$= 63$

294 For ccp Lattice $a = \frac{4r}{\sqrt{2}} = \frac{4 \times 215}{\sqrt{2}} = 608.2$ pm

295 $Ni_{0.98}O$

Ni^{+3} x Ni^{+2} 0.98-x

charge Balancing

$x \times 2 + (0.98 - x) \times 3 = 2$

$2x + 2.94 - 3x = 2$

$x = -0.94$

$x = 0.94$

fraction of $Ni^{+2} = \frac{0.94}{0.98} = 0.959$

298 CsCl → cation in cubic void

$\frac{r^+}{r^-} = 0.732$

$r^- = \frac{120}{0.732} = 164$ pm

304 When AgCl is dopped with $CdCl_2$

No of Cd^{+2} added = No of cation vacancies

306. A— → HCP ⟶ 6

$C \rightarrow \left(\frac{2}{3}\right) OV \rightarrow \frac{2}{3} \times 6 = 4$

C	A
4	6
2	3

C_2A_3

307 no. of atoms in FCC = 4

volume of 1 atom = $\frac{4}{3}\pi r^3$

Total volume of 4 atoms = $4 \times \frac{4}{3}\pi r^3$

$= \frac{16}{3}\pi r^3$

308 $r_{Na^+} + r_{F^-} = \frac{a}{2}$

281 pm $= \frac{a}{2}$

562 pm $= a$

309. O^{-2} forms ccp → 4

A occupy $\frac{1}{6}$th of THV → $\frac{1}{6} \times 8 = \frac{4}{3}$

B occupy $\frac{1}{3}$rd of OHV → $\frac{1}{3} \times 4 = \frac{4}{3}$

Fromula $A_{\frac{4}{3}}B_{\frac{4}{3}}O_4 \rightarrow ABO_3$

310 A occupy $\frac{3}{4}$ of THV ⇒ $\frac{3}{4} \times 8 = 6$

B forms ccp → 4

Formula, A_6B_4

→ A_3B_2

311 In fcc unit cell, (a = 361 pm)

$4r = \sqrt{3}\, a$

$r = \frac{\sqrt{3}}{4} a$

$= \frac{\sqrt{3}}{4} \times 361$

$r = 127$ pm

313 $d = \frac{Z \times M_w}{a^3 \times N_A}$

$10 = \frac{4 \times M_w}{(10^{-8})^3 \times 6 \times 10^{23}}$

$6 = 4 \times M_w$

$\frac{6}{4} = M_w \rightarrow 1.5$g

$mol = \frac{Mass}{M_w}$

$= \frac{100}{105}$

no of atoms

$= mo \times N_A$

$= \frac{100}{1.5} \times 6 \times 10^{23} = \frac{6}{1.5} \times 10^{25} = 4 \times 10^{25}$

314. A occupies corner $\rightarrow 8 \times \frac{1}{8}$

B = occupies face centres $\rightarrow 6 \times \frac{1}{2} = 3$

$\Rightarrow$ now atoms along one body diagonal are removed

A $\rightarrow 6 \times \frac{1}{8} = \frac{3}{4}$

Formula

$A_{\frac{3}{4}}B_3$

$\Rightarrow AB_4$

315. X forms fcc $\rightarrow 4$

Y occupies THV $\rightarrow 8$

Z occupies $\frac{1}{2}$ OHV $\rightarrow \frac{1}{2} \times 4$

Formula $X_4Y_8Z_2$

$\Rightarrow XY_4Z$

316. 4 atoms $\rightarrow$ 1 unit cell

1 atoms $\rightarrow \frac{1}{4}$ unit cell

$0.1\ N_A$ atom $\rightarrow \frac{0.1}{4} N_A$ unit cell

$\rightarrow 0.025\ N_A$ unit cell

317. In rock salt

A $\longrightarrow$ 4 FCC

B $\longrightarrow$ 4 OHV

C $\rightarrow$ 8 THV

Formula

$A_4B_4C_8$

ABC_2

SOLUTION

318. 30g ethylene glycol ($HO-CH_2-CH_2-OH$) is in 100 mL solution

moles of $C_2H_6O_2 = \frac{30}{62} = 0.484$

and moles of $H_2O = \frac{70}{18} = 3.89$

$X_{C_2H_6O_2} = \frac{0.484}{0.484+3.89} = \frac{0.484}{4.374} = 0.11$

319. Amount of urea $= \frac{15}{100} \times 500 + \frac{25}{100} \times 400$

$= 75 + 60 = 135$ g

% w/w $= \frac{135}{900} \times 100 = 15\%$

320. moles of acid $= \frac{3.7}{74} = 0.05$

molality of solution $= \frac{w}{m} \times \frac{1000}{w_{H_2O}} = \frac{0.05}{80} \times 1000$

$= 0.625$m

321. Molality $= \frac{w}{m} \times \frac{1000}{w_{(H_2O)}}$

$= \frac{3.5}{58.5} \times \frac{1000}{96.5} = 0.62$m

[$\because$ 3.5% NaCl solution = 3.5 g NaCl in 96.5g H_2O

322. $\frac{10}{180} \times 10 = \frac{4}{m_w} \times 10 \Rightarrow m_w = 4 \times 18 = 72$

323. $P_s = X_AP_A^\circ + (1 - X_A)P_B^\circ$

324. $\Delta T_f = i \times \frac{1000\,K_f\,w}{mW}$

$\Delta T_f = i \times K_f \times$ molality

$MgBr_2 \rightleftharpoons Mg^{+2} + 2Br^-$

$i = 1 - \alpha + 3\alpha$

$= 1 - 0.4 + 3 \times 0.4 = 1.8$

$\Delta T_f = 1.8 \times 1.86 \times 0.2$

$= 0.67$

and $T_f = T_f^\circ - \Delta T_f = -0.67°C$

325. volume of solution $= \frac{\text{Mass}}{\text{density}} = \frac{100}{1.052}$

$= 95.05$mL

Molarity $= \frac{12.25}{98} \times \frac{1000}{95.05} \Rightarrow 1.315$M

327. $i = \frac{(\Delta T_f)_{obs}}{(\Delta T_f)_{theo}} = \frac{(\Delta T_f)obs}{K_f \times \text{molality}}$

$i = \frac{0.558}{1.86 \times 0.1} = 3$

for $Hg(NO_3)_2 \rightleftharpoons Hg^{+2} + 2NO_3^-$

$i = 1 - \alpha + n\alpha$

$3 = 1 + \alpha(n-1)$

$\alpha = \frac{3-1}{3-1} = 1$ or 100%

330 $\quad 2A \rightarrow 5B$

Initially $\quad 2 \quad 0$

At solution $\quad 2-2\alpha \quad 5\alpha$

$$i = \frac{2}{2} = \frac{2\alpha + 5\alpha}{2} = \frac{2}{2} = \frac{0.6 + 1.5}{2}$$

$$= 1.45$$

331 $\quad \pi_1 = \pi_2$

$$c = \tfrac{1}{2}C$$

$$1 \times \frac{5}{60} \times 10 = 2 \times \frac{w}{58.5} \times 10$$

$$W = \frac{58.5}{20} \quad 2.925g$$

332 $\quad P = X_A P_A^\circ + X_B P_B$

$$P_s = X_A P_A^\circ + (1 - X_A) P_B$$

$$580 \quad X_A \times 440 + (1 - X_A) \quad 720$$

$140 = 280\ X_A$ and $X_A = 0.5$

$$Y_A = \frac{P_A}{P_s} = \frac{0.5 \quad 440}{580} = 0.38$$

340 $\quad \Delta T_b = \dfrac{1000 K_b w}{mW}$

and $\pi = \dfrac{1000 K_b w}{\Delta T w}$

342 $\quad \pi = CRT = \dfrac{w}{mV} RT$

343 $\quad Mg_2 \rightarrow Mg^{+2}$

$$i = \frac{1}{n-1} \quad \frac{1.92-1}{3-1} = \frac{0.92}{2} = 0.46$$

$$= 46\%$$

348 $\quad$ mole fraction of vinyl chloride $= \dfrac{n}{n_v + n_w}$

$$= \frac{0.09}{55.59} = 0.00162$$

$$X_{(v.c.)} = \frac{P}{K_H}$$

$$K_H = \frac{P}{X_{(v.c.)}} \quad \frac{1}{0.00162} = 617.284 \text{ bar}$$

350 $\quad A_2(SO_4)_3$

$$i = 5 \quad \alpha = \frac{i-1}{n-1}$$

$$0.9 = \frac{\alpha - 1}{5 \quad 1}$$

$$\alpha = 3.6 + 1 = 4.6$$

$$\pi = iCRT$$

$$= 4.6 \times \left(\frac{0.03}{6} M\right) R(298)$$

$$= 0.566 \text{ atm}$$

351 $\quad \Delta T = 9.3$

$$40 \times \frac{1000}{62 \quad (400 - x)} \times 1.86 \quad 9.3$$

$$\frac{40 \times 1000}{62 \times 9.3} \times 1.86 = 400 - x$$

$$x = 400 \quad 129.03$$

$$\boxed{x = 270.97}$$

352 $\quad$ x component then vapour pressure max

353 $\quad \pi = CRT = \dfrac{w}{Mw} \times \dfrac{1000}{v(m\text{L})} \times R \times T$

$$2.55 = \frac{4.34}{Mw} \times \frac{1000}{1000} \times 0.082 \times 298$$

$$M_w = 41.64$$

354 $\quad i$ values

$Li_2SO_4 = 3 \times 0.5 = 1.5$

$KCl = 2 \times 1 = 2$

$BaCl \quad 3 \times 0.5 = 1.5$

$A_2(SO_4)_3 = 5 \times 1 = 5$

Max i is for $Al_2(SO_4)_3$

355 $\quad \Delta T_f = mK_f = \dfrac{w}{Mw} \times \dfrac{1000}{W_A} \times K_f$

$$Mw = \frac{1}{0.4} \times \frac{000}{50} \times 5.12 = 256$$

356 $\quad P_s = P_B^\circ + x\,(P_A^\circ \quad P_B^\circ) = 160 + \dfrac{1}{2}(60 - 160)$

$160 - 50 = 110$

357 $m = \frac{1000M}{1000d - MMw}$

$\frac{120}{60} \times \frac{1000}{1000} = \frac{1000M}{1000 \times 1.5 - M(60)}$

$2.30 \times 1000 - 120\,M = 1000\,M$

$M = \frac{2.30 \times 1000}{1120} \quad 2.05$

359 $\Delta T_f = 1.22^\circ C$

$\frac{w}{Mw} \times \frac{1000}{W_A} \times K_f = 1.22$

$\frac{10}{Mw} \times \frac{1000}{100} \times 1.86 = 1.22$

$Mw = \frac{186}{1.22} = 152.4$

360. $n_{(solute)} = 20\% = 0.2$
$n_{(sol)} = 80\% = 0.8$
$P_S = X_B P_B^\circ + X_A P_A^\circ$
$P_s = 0.2 \times 75 + 0.8 \times 22$
$= 15.0 + 17.6$
$= 32.6$

361 $X_B = \frac{P^\circ - P_S}{P^\circ} = \frac{0.8 - 0.6}{0.8} = \frac{1}{4} = 0.25$

362 $N = \frac{20}{5.6} = 3.56$

363. α is max for $Al_2(SO_4)_3$

364 $\Delta T_f = 4 \times \frac{0.1}{329} \times \frac{1000}{100} \times 1.86 = 2.26 \times 10^{-2}$
$K_3[Fe(CN)_6] \quad i = 4$

365 $i = 2.74$

$\alpha = \frac{i-1}{n-1} = \frac{2.74 - 1}{3 - 1} = \frac{1.74}{2} = 0.87$
$= 87\%$

366 $\frac{1.05}{Mw} \times 10 = \frac{3}{180} \times 10$
$Mw = 1.05 \times 60 = 63$

367 $\frac{P^\circ - P_S}{P_S} \quad \frac{n_B}{n_A} = \frac{W_B / Mw_B}{W_A / Mw_A}$

$\frac{1020 - 990}{990} = \frac{5/x}{58.5/18} \quad \frac{5 \times 18}{58.5x}$

$\frac{30}{990} = \frac{5 \times 18}{58.5x} \Rightarrow x = 220$

368 α is max for $Al_2(SO_4)_3$
then i P is for option (4)

369 order of $\pi_1 > \pi_2 > \pi_3 > \pi_4$
order of osmotic pressure is also
$\pi_1 > \pi_2 > \pi_3 > \pi_4$

CHEMICAL KINETICS

371 $\frac{t_{3/4}}{t_{1/2}} = \frac{\frac{2.3}{k}\log\left(\frac{A_0}{0.25A_0}\right)}{\frac{2.3}{k}\log\left(\frac{A_0}{0.5A_0}\right)} = \frac{\log(4)}{\log 2} = \frac{2}{1}$

372 $K = A_0 e^{\frac{-Ea}{RT}}$

$\ln K = \ln A - \frac{Ea}{RT}$

373 $K_r = K_1 [m]^{1/m} = K_2 (2)^{1/m} \quad K_2 = (2)^m = 512K$

375 $A_0 - A = Kt$
$A_0 - 0.5 = 3 \times 10^{-2} \times 25$
$A_0 - 0.5 = 0.75 = 1.25M$

376 $\ln K = \ln A - \frac{Ea}{RT}$

$\ln K = \ln A - \frac{Ea}{R}\left(\frac{1}{T}\right)$ slope $= \frac{-Ea}{R}$

377

A	$\rightarrow$ 2B + C		
P_1	0	0	$P_1 - x + 2x + x = P_t$
P_1	x	2x	$x = \frac{P_t - P}{2}$

$K = \frac{2.303}{t}\log\frac{P}{P-x} = \frac{2.303}{K}\log\frac{2P}{3P-P}$

378 $ROR = \frac{-d[N_2]}{dt} \quad \frac{-d[H_2]}{3dt} = \frac{d[NH_3]}{2dt}$

$ROR = \frac{d[NH_3]}{2dt}$

$RDR = \frac{2.5 \times 154}{2} \quad 1.25 \times 10^{-4}$

$\frac{-d[H_2]}{dt} = \frac{3}{2}\frac{d[NH_3]}{dt} = \frac{3}{2} = 2.5 \times 10^{-4} = 3.75 \times 10^{-4}$

379 $\frac{dSO_3}{dt} = 1.6 \times 10^{-2}$ kg/min

$\frac{1.6 \times 10^{-2}}{80} \times 1000$ mol/min

$\frac{-dSO_2}{2dt} = \frac{-dO_2}{dt} = \frac{dSO_3}{2dt}$

$\frac{dSO_3}{dt} = \frac{dSO_2}{dt} = \frac{1.6}{80}$ mol/min

$\frac{dSO_2}{dt} = \frac{1.6}{80}$ mol/min

$\frac{1.6}{80} \times 64 \times 10^{-3}$ kg/mol

$= 1.28 \times 10^{-3}$ mol/min

380 $\frac{Exp(1)}{Exp(2)} \quad \frac{1.2\times10^{-3}}{2.4\times10^{-3}} = \frac{K(0.05)^x(0.05)^y}{K(0.10)^x(0.05)^y}$

$\frac{1}{2} = \left(\frac{1}{2}\right)^x \quad (x = 1)$

$\frac{Exp(1)}{Exp(3)} \quad \frac{1.2\times10^{-3}}{1.2\times10^{-3}} = \frac{K(0.05)^x(0.05)^y}{K(0.05)^x(0.10)^y}$

$1 = \left(\frac{1}{2}\right)^y \quad \boxed{y = 0}$

382 $10\text{gram} \xrightarrow{20\text{min}} 5\text{g} \xrightarrow{20\text{min}} 2.5\text{g} \xrightarrow{20\text{min}} 1.25\text{g} \xrightarrow{20\text{min}} 0.626\text{gram}$

384 Rate constant is independent of concentration of Reactant.

385 $\log K = \log A - 10\frac{Ea}{2.3RT}$

$\lim_{T\to\infty} \log K = \log A - \frac{Ea}{2.3RT}$

$= \log A$

388 unit of K $\boxed{\text{mol}^{1-n}\,L^{n-1}\,\text{sec}^{-1}}$

389 $r = K(A)^1$

$t_{1/2} = \frac{0.693}{K}$

390 $\boxed{t \propto \frac{1}{a}}$

392 $\Delta \quad Ea)f \quad (E_a)b$

$38 - 20 \quad Ea$

393 $r = K(A)^{1/2}(2)^2$

$r = 2 \times 2 \times 2 \Rightarrow 8$ times

394 $r = K(A_2)(B)\,K \to \frac{(A_2)}{(A)^2}\,(A_2) < K(A)$

$r < KK(A)(B)^1 \to n = 3$

396. $t = \frac{2.39}{K} \log\frac{9}{9}$

$t = \frac{2.303}{K} \log\frac{9}{9/4} \quad \frac{2.303}{K} \log 4$

398. $(B)\% > \frac{K_B}{K_A + K_B} \times 100$

403 $10\,k = 2.303 \log \frac{1}{1 - \frac{1}{4}} = 2.303 \log\frac{4}{3}$

$1k = 2.303 \log \frac{1}{1 - \frac{1}{16}} \quad 2.303 \log\frac{16}{15}$ (2)

(1),(2) $\frac{t}{10} = \frac{(\log 16) - (\log 15)}{(\log 4) - (\log 3)} \quad \frac{0.028}{0.125}$

$\Rightarrow t = \frac{0.28}{0.125}\,\text{min} = 2.24\,\text{min}$

404 $r = k[N_2O_5]^1$

$1.02 \times 10^{-4} = 3.4 \times 10^{-5}[N_2O_5]$

$\Rightarrow [N_2O_5] = \frac{1.02\times10^{-4}}{3.4\times10^{-5}} = 3M$

405. $N_2O_5 \longrightarrow N_2O_4 + \frac{1}{2}O_2$

$t = 0 \quad 11MM \quad O \quad O$

$t = 20s \quad 114 \times \quad x \quad \frac{x}{2}$

$114 + \frac{x}{2} = 133 \Rightarrow x = 38$ mm

$r = \frac{x}{t} = \frac{38}{20}$

$r = 1.9$ mm sec^{-1}

$r = \frac{1.9}{760} = 2.5\times10^{-3}$ atm sec

406 $A + B \longrightarrow C + D$

$t \quad 0 \quad 1M \quad 1M$

$r = k[A]^{1/2}[B]^{1/2}$

if initial concentration of A & B are same then $r = k(A)$

$t = \frac{2.303}{2.303\times10^{-3}} \log\frac{1}{0.}$ = 1000 sec

408 $r_0 = k_0[A]^n = \frac{r_1}{r_0} = \frac{k_1}{k_0}$ (1)

$r_1 = k_1[A]^n$

For zero order $(t_{1/2})_0 = \frac{[A]_0}{2k_0}$

For 1st order $(t_{1/2})_1 = \frac{0.693}{k_1}$

$\Rightarrow (t_{1/2})_0 : (t_{1/2})_1$

$\frac{[A]_0}{2k_0} = \frac{0.693}{k_1}$

$\frac{k_1}{k_0} = \frac{2(0.693)}{[A]_0} = \frac{1.386}{1}$

ELECTROCHEMISTRY

411 Anode reaction $A \rightarrow A^{+2} + 2e$

cathode reaction $2A^{+3} + 2e^- \rightarrow 2A^{+2}$

$E^\circ_{cell} = E^\circ_{cathode} - E^\circ_{Anode}$

$= 0.4 - (-0.3)$

$= 0.7$ V

412 $nFE^\circ = 2.303\ RT \log K$

$\log K = \frac{nFE^\circ}{2.303RT} = \frac{2\times96500\times1.5}{2.303\times8.3\times298}$

$K = 6.6 \times 10^{50}$

413. oxidising power $\propto$ SRP

414 $\alpha = \frac{\Lambda_m^c}{\Lambda_m^\infty}$, $K_c = \frac{C\alpha^2}{1-\alpha}$

415. $Fe^{+2} + 2e^- \rightarrow Fe(s)$ $\Delta G_1^0 = -2FE_1^0$

$Fe^{+2} \longrightarrow Fe^{+3} + e^-$ $\Delta G_2^0 = -1\ E_2^\circ$

$Fe^{+3} + 3e^- \longrightarrow Fe(s)$ $DG_3^0 = -3FE_3^\circ$

$\Delta G_3^\circ = \Delta G_1^\circ - \Delta G_2^\circ$

$-3E_3^\circ = 2 \times 0.447 - 1\times 0.771$

$E_3^\circ = -0.041$ V

417 $2Ag + Cu \rightarrow 2Ag + Cu$

$\Delta G^\circ = -nF\ E^\circ_{cell}$

$= 2 \times 96500 \times 0.4$

$= 77.2$ KJ

420 E°_{cell} = positive

$\Delta G^\circ = nF\ E^\circ_{cell}$

ΔG° = Negative

$\Delta G^\circ = 2.303\ RT \log K_{eq}$

$\log K_{eq}$ = +ve value

$K_{eq} > 1$

421 $E^\circ_{cell} = E^\circ_{RP}$ (cathode) $- E^\circ_{RP}$ (Anode)

$= 1.428 - (-2.714)$

$= 4.142$ V

422 Reducing power $\propto$ SOP $\propto \frac{1}{SRP}$

423 $E^\circ(I_2/2I^-) > E^\circ(Cr^{+3}/Cr^{+2})$

So I_2 will reduced to I^- and Cr^{+2} will oxidised to Cr^{+3}

424 According to Kohlrausch law

$\Lambda^\infty_{m(CH_3COONa)} + \Lambda_{m(HCl)} - \Lambda^\infty_{m(NaCl)}$

426 According to faraday's second law

$\frac{W_{Ag}}{E_{Ag}} = \frac{W_{O_2}}{E_{O_2}} \Rightarrow W_{O_2} = 31.75$ g

427 $Cr_2O^{-2} \rightarrow 2Cr^{+3} + 6e$

0.1 mole 0.6 mole

Charge required $= 0.6\ F = 0.6 \times 96500$

$= 57900C$

430 $2H^+(aq) + 2e \rightarrow H_2(g)$

$E = E^\circ - \frac{2.303\times8.314\times323}{2\times96500}\log\frac{P_{H_2}}{[H^+]^2}$

$0 = 0 - \frac{2.303\times8.314\times323}{2\times96500}\log\frac{P_{H_2}}{[H^+]^2}$

$10^{\frac{P_{H_2}}{[H^+]^2}} = 1$

$pH_2 = 10^{-6}$ atm

431 $Q = ne = It$

$n = \frac{I\times t}{e} = \frac{2\times120}{1.6\times10^{-19}} = 1.5 \times 10^{21}$ electron

434 $E^\circ_{cell} = 0.8 - 0.77 = 0.03$ V

$\Delta G^\circ = -nFE^\circ_{cell} = -1 \times 96500 \times 0.03$

$= -2895$ J/mol

436. $Q = I \times t$

$= 1.5 \times 10 \times 60$

$= 900C$

Reaction occuring at the cathode is

$Cu^{+2} + 2e^- \rightarrow Cu$

$2F = 2 \times 96500$ deposit 1 mole Cu(63.5g)

$= 0.296$ g

440 Metal ion having higher SRP is displaced by lower SRP metal

IMPORTANT NOTES

INORGANIC CHEMISTRY

PERIODIC TABLE

1 s atomic numbers 117 120 is discovered then their blocks w be
(1) s, p (2) p, s (3) p, d (4) d, p

2 ncreasing orde of metallic character wi l be
1) P < Si < Be < Mg < Na
(2) P > S > Be > Mg > Na
(3) P < Si < Be > Mg < Na
4) P > Si < Be < Mg < Na

3. Among the following largest and smallest size wil be Mg, Mg^{+2}, A, A^{3+}
(1) Mg^{+2}, Al^{3+} (2) Al^{3+}, Mg^{+2}
(3) Al^{3+}, Mg. (4) Mg, Al^{3+}

4 The first I.E. values of third period elements Na Mg, Si are respectively 496, 737, 786 KJ mol^{-1} then first IE of Al will be close o
(1) 760 KJ mol^{-1} (2) 830 KJ mol
(3) 575 KJ mol^{-1} (4) 1050 KJ mol

5 Among P, S, Cl, F most and least negative ΔH_{eg} wi l be of
(1) Cl, P (2) P, Cl (3) Cl, F (4) F, Cl

6 The following order is valid for Li < B < Be < C < O < N < F < Ne
(1) E (2) EGE (3) EN (4) size

7 OF_2 is
(1) Oxide of fluorine
(2) Fluoride of oxygen
(3) It is a inter halogen compound
(4) It cannot act as a florinating agent

8. Correct order of Chem cal reactivity in terms of oxidiz ng property is
(1) F > Cl > O > N (2) F > O > C > N
(3) Cl > F > O > N (4) O > F > N > Cl

9. H ghest floroanion of Boron and Aluminium is.
(1) BF_6^{3-}, AlF_6^{3-} (2) BF_4^-, AlF_6^-
(3) BF_4^-, AlF_6^{3-} (4) BF_4^-, AlF_4^-

10 The most fundamental property for the classification of elements is
(1) Atomic No (2) Atom c Mass
(3) No. of Nucleons (4) None of these

11 e conf guration of $_{90}Th$
(1) $(n-2)f^1$ $(n-1)d$ ns
(2) $(n-2)f^1$ $(n-1)d^1ns^2$
(3) $(n-2)f^2$, $(n-1)d^1ns^2$
(4) $(n-2)f^2$, $(n-1)d^1ns^1$

12 Match the column
Column 1 Column 2
(a) Z = 120 (P) Sg
(b) Seaborg s group (Q) B
(c) Non metal (R) P aced in g.p. = 2
(d) Lawrence Berkeley (S) L Laboratory
(1) (a) R (b) Q (c) P (d) S
(2) (a) R (b) P (c) Q (d) S
(3) (a) - S (b) P (c) R (d) Q
(4) (a) Q (b) R (c) P (d) S

13 Which of the following is not an actinoid?
(1) C rium (Cm) (2) Ca fornium (Cf
(3) Uranium (U) (4) Terbium (Tb)

14. Which order for atom c radii s incorrect?
(1) H > L $^{+2}$ > Mg^{+2} > Al
(2) MnO_2 > $KMnO_4$
(3) O^{-2} > F > Na^+ > Mg^{+2}
(4) B > Al = Ga < In = Tl

15 Which is not incorrect for acidic strength?
(1) $H_2S < H_2Se < H_2Te$
(2) $HClO_4 > HClO_3 > HClO_2 > HClO$
(3) $P_4O_{10} > SiO_2$
(4) All are correct

16. Which is incorrect?
(1) Na < Al < Mg < S IP order
(2) V < Cr < Fe < Mn IP_2 order
(3) P < Si < Be < Mg < Na Meta ic Charactor
(4) Yb > Ce > Lu > Sn order of atomic radius

17 Which is correct for ΔH_{eg}?
(1) Cl > F > Br > I > S (2) O > O > O
(3) S > O (4) Cl > F > S > O > N > P

18. Match the column -
Column I Column I
(a) N O (P) Normal Ox de
(b) Na_2O (Q) Neutral Ox de
(c) Ga O (R) Sub Oxide
(d) C_3O_2 (S) Basic Ox de
(e) V_2O_4 (T) Amphoter c Oxide
(U) Mixed Ox de
(1) (a) Q (b) P,S (c) - R (d) - I (e) U
(2) (a) Q (b) P S (c) T (d) R (e) U
(3) (a) - R P (b) Q,S (c) U (d) T (e) R
(4) (a) - P Q (b) R S (c) T (d) U, (e) R

19 Which is not correct?
(1) In first transition series Total elements = 10
(2) Telluric Helix screw Law-De chancourtois
(3) Total liquid metals and non metals respectively = 5, 1
(4) E.N order = Zr > Hf

20 Which has maximum number of unpaired e⁻?
(1) Na (2) Mn (3) Cr (4) Fe^{+2}

21 In which of the following pairs, first member has higher first IP
(a) N,O (b) B, Be (c) Al, Ga
(d) F, Cl (e) Zn, Ga (f) F^-, Cl^-
Correct option is
(1) a,c,f,d (2) a,d,e (3) b, d, e, f (4) a, d, e, f

22. Correct order of electron gain enthalpy (with negative sign) of O, F, S, Cl is
(1) F > Cl > O > S (2) Cl > F > S > O
(3) F > O > Cl > S (4) Cl > S > F > O

23 Correct order of atomic radii
(1) $I^- > I > I^+$ (2) $I^+ > I > I^-$
(3) $I > I^+ > I^-$ (4) $I > I^- > I^+$

24. The electronic configuration of Gadolinium (Z = 64) is
(1) $[Xe]\ 4f^3\ 5d^5\ 6s^2$ (2) $[Xe]\ 4f^7\ 5d^1\ 6s^2$
(3) $[Xe]\ 4f^7\ 5d^0\ 6s^1$ (4) $[Xe]\ 4f^8\ 5d^0\ 6s^2$

25. Which of the following metal hydroxide is soluble in NaOH
(1) $Be(OH)_2$ (2) $Mg(OH)_2$
(3) $Ca(OH)_2$ (4) $Ba(OH)_2$

26 The smallest cation and the smallest anion are respectively
(1) H^+ and H^- (2) H^+ and F^-
(3) Li^+ and H^- (4) Li^+ and F^-

27 Which among the following statement is wrong
(1) Electronic configuration of Gd_{64} is $4f^8 5d^1 6s^2$
(2) Ce^{4+} is a good reductant
(3) Actinoids exhibit higher oxidation states than Lanthanoids
(4) Actinoids contraction is greater from element to element than Lanthanoid contraction

28 Which of the following order of IP is incorrect
(1) Na > Mg^+ (2) Mg^{+2} > Mg^+
(3) He > Li^+ (4) Be > B

29 Correct order of E is for (K, K^+, Cu, Cu^+)
(1) Cu < K < K^+ < Cu^+ (2) K < Cu < Cu^+ < K^+
(3) K < Cu < K < Cu^+ (4) Cu^+ < Cu < K < K^+

30 Which represents the electronic configuration of the most electropositive element
(1) $[He]2s^1$ (2) $[Xe,6s$
(3) $[He]\ 2s^2$ (4) $[Xe]6s^2$

31 A sudden large jump between the values of second and third ionization energies of an element would be associated with the electron configuration
(1) $1s^2\ 2s^2\ 2p^6,\ 3s$
(2) $1s^2\ 2s^2\ 2p^6\ 3s^2,\ 3p^1$
(3) $1s^2,\ 2s^2,\ 2p^6\ 3s^2,\ 3p^2$
(4) $1s^2,\ 2s^2,\ 2p^6,\ 3s^2$

32 The order of first electron affinity of O, S and Se is
(1) O > S > Se (2) S > O > Se
(3) Se > O > S (4) S > Se > O

33 The most basic oxide among the following is
(1) Na_2O (2) BaO (3) As_2O_3 (4) A_2O_3

34 Correct order of increasing atomic size is
(1) N < F < Si < P (2) F > N < P < Si
(3) F < N < P < Si (4) F < N < Si < P

35 The correct order of second IP is
(1) Na < Mg > Al < Si (2) Na > Mg < Al > Si
(3) Na > Mg > Al < Si (4) Na > Mg > Al > S

36 Select the correct order of first ionisation potential
(1) $O_2^{2+} > O_2$ (2) $O_2^{2+} < O_2$
(3) $O_2 \approx O_2^+$ (4) None of these

37 The ionisation energy will be maximum for the process
(1) $Ba \rightarrow Ba^{+2}$ (2) $Be \rightarrow Be^{+2}$
(3) $Cs \rightarrow Cs^+$ (4) $Li \rightarrow Li^+$

38 Incorrect order of size is :-
(1) $I^+ < I > I^-$
(2) Fe = Co = Ni
(3) Ni < Cu < Zn
(4) Al

39 Correct order of electron affinity is
(1) F > Cl > O > S (2) Cl > F > S > O
(3) Cl > S > F > O (4) Cl > S > O > F

40 Correct order of atomic/ionic size of following is
(1) $Mg^{+2} > Na^+ > F^- > O^{-2}$
(2) $Na^+ > Mg^{+2} > O^{-2} > F^-$
(3) $O^{-2} > F^- > Na^+ > Mg^{+2}$
(4) $O^{-2} < F^- > Na^+ > Mg^{+2}$

41 Amongst the following elements whose electronic configuration is given below the one having highest ionisation enthalpy is
(1) [Ne]3s²3p (2) [Ne]3s²3p²
(3) [Ne]3s²3p³ (4) [Ar]3d¹⁰4s²4p³

CHEMICAL BONDING

42 Which of the following molecule/species have same bond order as that of O_2^{+1}?
(1) NO (2) N_2
(3) N_2^+ (4) All of these

43 Which of the following molecule/species are iso-structural with N_3^{-1} ion?
(1) I_3^{-1} (2) I_3^- (3) NH_2^{-1} (4) HCO_2^{-1}

44 Which of the following pair of species are iso-electronic?
(1) CN & NO^+ (2) N_2^{-1} & N_2^{+1}
(3) $H_2^{\oplus}$ & H_2^{-1} (4) CO & NO^{+1}

45. Which of the following molecule is/are Hypovalent?
(1) AlF_3 (2) ICl_2^{-1}
(3) BCl_3 (4) ICl_2^{+1}

46 Determine the Bond order & formal charge on each oxygen atom in HCO_2^{-1} Respectively?
(1) 1.5, –0.5 (2) 2, –0.5
(3) 1.33, –1.5 (4) 1.5, 1.33

47 Determine the incorrect order of Bond angle?
(1) $NH_3 < NF_3 < NCl_3$ (2) $OF_2 < OH_2 < OCl_2$
(3) $SF_2 < SCl_2 < SBr_2 < SI_2$ (4) $ClO_2 > ClO_2^{-1} < OCl_2$

48. Which of the following molecule is/are non-polar & planar?
(1) XeF_4 (2) NH_2^{-1}
(3) PF_3Cl_2 (4) PCl_3F_2

49 For Which of the following molecule H.E. is Higher than its L.E.?
(1) $BeSO_4$ (2) $BaSO_4$
(3) $CaSO_4$ (4) $SrSO_4$

50 Which of the following has maximum no. of lone pair at central atom?
(1) XeF_2 (2) XeF_4
(3) XeF_6 (4) XeO_2F_2

51 Dative Bond is present in –
(1) KNO_2 (2) KHF
(3) KI_3 (4) Ar^+

52 Which is iso-structural?
(1) XeF_3^-, ICl_2^-, ClF (2) CF_4, PCl_4^+, NCl_4^+
(3) CO_2, XeF_2, I_3^- (4) PCl, XeOF, ICl_4^-

53 Which of the following mol. have both pπ - pπ and pπ - dπ Bonding?
(1) ClO_2^- (2) NO_2^{+1}
(3) SO_3^- (4) ClO_4^-

54 Select correct order out of given options
(1) $BeCO_3 < BaCO_3$ → Covalent character
(2) BeO > SrO → Lattice energy
(3) $Be^{2+} < Li^+$ → Hydration energy
(4) $Be_{(aq)} < Li_{(aq)}$ → Ionic Mobility

55 Which of the following one of the following is least soluble in Acetone?
(1) AgCl (2) NaCl
(3) CCl_4 (4) LiCl

56 Bond length and Bond energy order is same for–
(1) C - C > Si - Si > Ge - Ge
(2) N - N > O - O > F - F
(3) C - N > C - O > C - F
(4) $F_2 > Cl_2 > Br_2 > I_2$

57 Which one is Highest melting Halide?
(1) NaCl (2) LiCl
(3) LiBr (4) NaI

58 If AB_4^n, type species are tetrahedral, the Which of the following is/are.
Incorrectly Match -

	A	B	n
(1)	Xe	O	Zero
(2)	Se	F	Zero
(3)	P	O	-3
(4)	N	H	+1

59 The species having no pπ - pπ bond but its bond order equal to that of O_2
(1) CO_3^{-1} (2) PO_4^{3-}
(3) SO_4^{2-} (4) XCO_3

60 How many π bond does C have?
(1) 1 (2) 2
(3) 0 (4) 3

61 Which of the following mol is Least Volatile?
(1) HF (2) HC
(3) HBr (4) H

62 Match the following and choose the correct option given below
(a) $N_2 \rightarrow N_2^+$ (p) bond order increase
(b) $N_2 \rightarrow N_2^-$ (q) bond order decrease
(c) $O_2 \rightarrow O_2^+$ (r) paramagnetism increase
(d) $O_2 \rightarrow O_2^-$ (s) paramagnetism decrease
(t) No change in bond order
(1) a - (q, r), b - (q, r), c - (p, s), d - (q, s)
(2) a - (q, s), b (q, s), c - (p, s), d (q, r)
(3) a - (p, q), b - (q, s), c - (p, r), d - (q, t)
(4) a (p, s), b (q, p), c - (q, r), d (q, t)

63 Which pair(s) has same bond angle?
(a) BF_3, BCl_3 (b) PO_4^{-3},SO_4^{-2} (c) BF_3, PF_3
(d) NO_2^-,N_2O (e) N_3^-,NO_2
correct option are –
(1) a, b, d (2) b, d
(3) b, c, d (4) a, d, e

64 Which is correct?
(1) PbS > ZnS (Solubility)
(2) Li_2CO_3 > Na_2CO_3 (Thermal Stability)
(3) NaF > KF (Lattice energy)
(4) $BaSO_4$ > $MgSO_4$ (Solubility)

65 Which among the following attraction is strongest?
(1) HF H_2O (2) Na+...H Cl
(3) H_2O C_2 (4) Cl–C Cl–C

66 Among the following, the pair in which the two species are not isostructural is
(1) IO_3^- and NH_3 (2) BH_4^- and NH_4^+
(3) PF_6^- and SF_6 (4) SiF_4 and SF_4

67 Which of the following species contains only π bond?
(1) CN^- (2) CO
(3) C_2 (4) O_2^-

68 Correct order of strength of H-bond
(1) H_2O > H O (2) H O < H O
(3) HF < H O (4) NH > HF

69 XeF_4 is isostructural with
(1) CH_4 (2)
(3) (4) CCl_4

70 Hydration energy of Mg^{2+} is higher than
(1) Be^{2+} (2) Na^+
(3) Al^{3+} (4) All of these

71 Total number of sphybridised C atoms in the following Hydrocarbon will be
$H_3C-C\equiv C-CH=CH$
(1) 5 (2) 4 (3) 2 (4) 1

72. Match the column
Column I	Column II
(a) C_2H_2	(P) sp^3d hybridisation
(b) SO_2	(Q) sp^2 hybridisation
(c) I_3^-	(R) sp^3 hybridisation
(d) NH_4^+	(S) sp hybridisation

(1) (a) S (b) P (c) R (d) Q
(2) (a) P (b) S (c) R (d) Q
(3) (a) S (b) R (c) P (d) Q
(4) (a) R (b) S (c) P (d) Q

73 Match the column
Column I (Compound)	Column II (Examples)
(a) Covalent	(P) SrO_2 CH_4
(b) Molecular	(Q) CaO
(c) Ionic	(R) CC_4
(d) Metallic	(S) Bronze

(1) (a) P (b) Q (c) R (d) S
(2) (a) R (b) P (c) Q (d) S
(3) (a) S (b) P (c) Q (d) R
(4) (a) P (b) R (c) Q (d) S

74 Match the column
Compound	No. of σ & π Bonds
(a) $H_2S_2O_3$	(P) 6 σ & 2 π
(b) H_2SO_5	(Q) 11 σ & 4 π
(c) $H_2S_2O_8$	(R) 9 σ & 4 π
(d) $H_2S_2O_6$	(S) 7 σ & 2 π

(1) (a) S (b) P (c) Q (d) R
(2) (a) P (b) S (c) Q (d) R
(3) (a) P (b) Q (c) R (d) S
(4) (a) Q (b) S (c) P (d) R

75. Match the column

Compound	Shape
(a) XeO_2F_2	(P) Linear
(b) XeF_5	(Q) Square Planar
(c) I_3	(R) See-Saw
(d) XeF_4	(S) Pentagonal Planar

(1) (a) R (b) S (c) P (d) Q
(2) (a) R (b) S (c) Q (d) P
(3) (a) P (b) S (c) Q (d) R
(4) (a) S (b) Q (c) P (d) R

76 Which is incorrect?
(1) Dipole moment order $\rightarrow CH_4 < NF_3 < NH_3 < H_2O$
(2) For PCl_5 molecule $\rightarrow B.L._{equatorial} < B.L._{Axial}$
(3) Melting point order $\rightarrow H_2O_{(s)} > NH_{3(s)} > HF_{(s)}$
(4) no. of unpaired e^- in $H_2O_2 = 1$

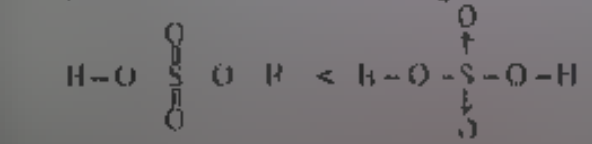
77. Which is correct?
(1) Bond order $\rightarrow CO > CO_3^{2-}$
(2) Bond Angle $\rightarrow PH_3 > PF_3$
(3) Bond energy $\rightarrow Cl_2 > Br_2 > I_2 > F_2$
(4) Bond length order $\rightarrow C\text{-}C < N\text{-}N < O\text{-}O < F\text{-}F$

78. Which is not correct?
(1) White vitriol and epsom salt are isomorphous
(2) Thermal Stability
$\rightarrow BeCO_3 < MgCO_3 < CaCO_3 < SrCO_3$
(3) Solubility
$\rightarrow NaHCO_3 < KHCO_3 < RbHCO_3 < CsHCO_3$
(4) Melting Point $\rightarrow Al_2O_3 < MgF_2$

79. Which molecule does not exist?
(1) MnF_4 (2) SH_6
(3) $(BCl_3)_2$ (4) 2 & 3 both

80. Which is correct?
(1) Ionic mobility in aqueous medium
$\rightarrow Li^+ < Na^+ < K^+ < Rb^+$
(2) Covalent character
$\rightarrow KCl > CaCl_2 > AlCl_3 > SnCl_4$
(3) Boiling point order $\rightarrow H_2O > H_2Se > H_2Te > H_2S$
(4) Dipole – dipole attraction $\rightarrow KCl + H_2O$

81 Which is not Incorrect?
(1) Lewis dot structure stability order



(2) In XeF_4(s) Hybridisation of anion $\rightarrow sp^3d$
(3) For O_2 molecule bond order is 2.0
(4) Bond angle order $CF_4 < CH_4$

82 Match column I and Column II

Column I	Column II
(A) SF_4	(1) tetrahedral
(B) BrF_3	(2) pyramidal
(C) BrO_3^-	(3) See-saw
(D) NH_4^+	(4) Bent T

Code
(1) A (3), B (2) C (1) D (4)
(2) A (3) B (4) C (2) (D) 1
(3) A (2) B (4) C (3) (D) 1
(4) A (1), B (4), C (2), D (3)

83 Consider the following order
(1) $PH_3 > NH_3 > AsH_3$ (basic character)
(2) $PH_3 > NH_3 > AsH_3$ (boiling point)
(3) $HOCl > HClO_2 > HClO_3 > HClO_4$
(oxidising property)
(4) HF > HCl > HBr > HI (acidic)
(5) $H_2O > H_2S > H_2Se$ (bond angle)
(6) $H_2SO_4 > H_3PO_4 > H_2CO_3$ (acidic character)
correct order(s) are
(1) 1,2,4,5 (2) 2,3,5,6
(3) 3,5,6 (4) 4,5,6

84 Which solubility order is correct
(1) $BaSO_4 > SrSO_4 > CaSO_4 > MgSO_4$
(2) $ZnS > Na_2S > CoS$
(3) $BaCO_3 > MgCO_3 > Na_2CO_3$
(4) $KOH > NaOH > Mg(OH)_2$

85 What is incorrect about reaction of NH_3 and BF_3?
(1) hybridisation of both N & B change
(2) It is an example of redox change
(3) In the final adduct formed back bonding appears between B & N
(4) All

86 In molecule / ion there are more than 1 type of XO bond lengths
(a) NO_3^- (b) $Cr_2O_7^{2-}$
(c) $HCOO^-$ (d) $HClO_3$
(e) PO_4^{3-} (f) SO_4^{2-}
correct code is
(1) a,b,d (2) b,d
(3) b,c,d,f (4) a,b,c,f

87 Correct order of dipole moment is
(1) CH_3Cl, CH_3Br, CH_3F
(2) CH_3F, CH_3Cl, CH_3Br
(3) CH_3Cl, CH_3F, CH_3Br
(4) CH_3Br, CH_3Cl, CH_3F

88 Correct order of stability of species
N_2, N_2^+, N_2^-
(1) $N_2 > N_2^+ = N_2^-$ (2) $N_2 > N_2^+ > N_2^-$
(3) $N_2^+ > N_2 > N_2^-$ (4) $N_2^- > N_2 > N_2^+$

89 Isostructural species are those which have same shape & hybridisation. Among the following pair identify isostructural pairs.
(1) [NF_3 & BF_3] (2) [BF_4^- & NH_4^+]
(3) [BCl_3 & $BrCl_3$] (4) [NH_3 & NO_3^-]

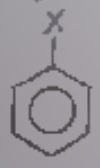
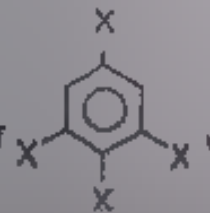
90 Which is not stable
(1) KHF_2 (2) KI_3
(3) CH_3–$CH(OH)_2$ (4) Cl_3C–$CH(OH)_2$

91 Which of the following compound give metal and oxygen gas at high temperature
(1) $NaNO_3$ (2) Ag_2CO_3
(3) K_2CO_3 (4) Li_2CO_3

92 KF combines with HF to form KHF_2. The compound KHF_2 contains the species
(1) K^+, F^-, H^+ (2) K^+, F^-, HF
(3) K^+, $[HF_2]^-$ (4) F^-, $[KHF]^+$

93. Which of the following represent most effective π-bond
(1) 2pπ-3pπ (2) 3dπ-3dπ
(3) 2pπ-3dπ (4) 3dπ-3pπ

94. In which reaction hybridisation of underline atom does not changed
(1) $\underline{B}F_3 + F^- \rightarrow BF_4^-$
(2) $\underline{N}H_3 + H^+ \rightarrow NH_4^+$
(3) $\underline{B}F_3 + NH_3 \rightarrow BF_3.NH_3$
(4) $\underline{Si}F_4 + 2F^- \rightarrow SiF_6^{2-}$

95 Dipole moment of  is 1.5 D. The dipole moment of  will be
(1) 1.5 D (2) 3.0 D (3) 1.0 D (4) 2.35 D

96 Which of the following compound has non zero dipole moment
(1) XeF_4 (2) B_2H_6 (3) PF_2Cl_3 (4) PCl_3F_2

97 Which of the following molecule is planar due to back bonding
(1) NCl_3 (2) PF (3) BF_3 (4) None

98 Amongst the following molecules having maximum bond angles of 90° is
(1) XeF_4 (2) XeF_2 (3) SF_4 (4) IF

99 Which of the following statement is incorrect
(1) Removal of an electron is easier from O in comparison to O_2
(2) In the double bond of C_2 molecule, both are π bonds
(3) NO is more stable than NO$^+$
(4) NO_2^+ and CO_2 are isoelectronic and isostructural

100 The coordinate bond is absent in
(1) NaNO (2) $CaCO_3$ (3) O (4) KNC

101 Which of the following is least stable
(1) O (2) C (3) B (4) Be

102 The hybridisation of Si in silicon dioxide (silica) is
(1) sp (2) sp^2 (3) sp^3 (4) dsp^2

103 The bond order for NO and NO$^+$ respectively is
(1) 3.0, 2.5 (2) 2.5, 3.0
(3) 3.0, 3.0 (4) 2.5, 2.5

104 Back bonding always changes
(1) bond angle
(2) hybridisation of central atom
(3) planarity
(4) bond length

105 Bond angle in H_2O is
(1) 104.5° (2) 120° (3) 109.5° (4) 107°

106 The correct stability order of N_2 and its given ions is
(1) $N_2 > N_2^+ > N_2^- > N_2^{2-}$
(2) $N_2^- > N_2^+ > N_2 > N_2^{2-}$
(3) $N_2^+ > N_2 > N_2^- > N_2^{2-}$
(4) $N_2 > N_2^+ = N_2^- > N_2^{2-}$

107 Among LiCl, $BeCl_2$, BCl, and CCl_4, the covalent bond character follows the order
(1) LiCl > $BeCl_2$ > BCl > CCl_4
(2) LiCl < $BeCl_2$ < BCl < CCl_4
(3) LiCl > $BeCl_2$ > CCl_4 > BCl
(4) LiCl < $BeCl_2$ < BCl < CCl_4

108 In XeF_2, XeF_4, and XeF_6, the number of lone pairs of electrons on Xe are respectively
(1) 2, 3, 1 (2) 1, 2, 3 (3) 3, 1, 2 (4) 3, 2, 1

109 Which one is most soluble in water
(1) Mg(OH) (2) $Sr(OH)_2$
(3) $Ca(OH)_2$ (4) Ba(OH)

110 The correct order of N–O bond length is
(1) $NO_2^- > NO_3^- > NO^+$
(2) $NO_3^- > NO_2^- > NO_2^+$
(3) $NO_2^+ > NO_3^- > NO_2^-$
(4) $NO_3^- > NO_2^- > NO^+$

111 The correct order of A–O–A bond angle of (A=H, F or Cl)
(1) $H_2O > Cl_2O > F_2O$ (2) $Cl_2O > H_2O > F_2O$
(3) $F_2O > Cl_2O > H_2O$ (4) $F_2O > H_2O > Cl_2O$

112 Correct order of dipole moment is
(1) $CH_3Cl > CH_3F > CH_3Br > CH_3I$
(2) $CH_3F > CH_3Cl > CH_3Br > CH_3I$
(3) $CH_3Cl > CH_3Br > CH_3I > CH_3F$
(4) $CH_3F > CH_3Cl > CH_3I > CH_3Br$

113. Which of the following has fractional bond order
(1) O_2^{2+} (2) O_2^{2-} (3) F_2^{2-} (4) H_2

114. When $AgNO_3$ is heated strongly, the product formed are
(1) NO and NO_2 (2) NO_2 and O_2
(3) NO_2 and N_2O (4) NO and O_2

115. Which of the following carbonate of a metals has the least thermal stability
(1) Li_2CO_3 (2) K_2CO_3
(3) Cs_2CO_3 (4) Na_2CO_3

116 The correct order of melting point is
(1) LiCl > NaCl > KCl < CsCl
(2) LiCl > NaCl > KCl > CsCl
(3) NaCl > KCl > CsCl > LiCl
(4) LiCl > NaCl > CsCl > KCl

117 The state of hybridisation for the transition state of hydrolysis mechanism of BCl_3 and SF_4 are respectively
(1) sp^2, sp^3d (2) sp^2, sp^3
(3) sp^3, sp^3 (4) sp^3, sp^3d^2

118. The dipole moment of AX_3, BX_3 and CY_4 are 4.97×10^{-30}, 0.60×10^{-30} and 0.00 Cm respectively then the shape of molecule may be
(1) pyramidal, T shape, trigonal planar
(2) pyramidal, trigonal planar, T shape
(3) T-shape, pyromidal, trigonal planar
(4) pyramidal, T-shape, linear

119 The bond strength in O_2^+, O_2, O_2^- & O_2^{2-} follows the order
(1) $O_2^+ > O_2^- > O_2 > O_2^{2-}$
(2) $O_2^+ > O_2 > O_2^- > O_2^{2-}$
(3) $O_2^- > O_2^+ > O_2^{2-} > O_2$
(4) $O_2^- > O_2^{2-} > O_2^+ > O_2$

120 A compound which leaves behind no residue on heating is
(1) $C(NO_3)_2$ (2) KNO_3
(3) NH_4NO_3 (4) None of these

121 Which of the following molecule is polar and non planar
(1) XeF_4 (2) XeF (3) CH_2F (4) ClF_3

122 Dipole moment of NH_3 is more than NF_3 because
(1) N–F bond is more polar than N–H bond
(2) NH_3 is pyramidal while NF_3 is planar
(3) in NH_3 orbital dipole due to lone pair is in the same direction as the resultant dipole moment of N–H bonds while in NF_3 orbital dipole due to lone pair is opposite direction of the resultant dipole moment of N–F bonds
(4) None of these

123. Which of the following pairs of ions are isoelectronic and isostructural
(1) CO_3^{-2}, NO_2^- (2) ClO^-, CO
(3) SO_3^{-2}, NO_3^- (4) ClO^-, SO_3^{-2}

124. Which of the pair is having planar structure
(1) SF_4, XeF_4 (2) H_3O^+, SO_3
(3) BF_3, $XeOF_2$ (4) XeF_6, NO_3^-

125. Ammonia is soluble in water but phosphine is insoluble because
(1) phosphine has higher molecular mass than ammonia
(2) ammonia is polar while phosphine is non polar
(3) Ammonia forms inter molecular H bond with water but not phosphine
(4) Ammonia is ionic while phosphine is covalent

126 Which of the following resist hydrolysis at room temperature
(1) PCl_5, SF_6 (2) CCl_4, NO_3^-
(3) PCl_5, XeF_6 (4) SF_6, CCl_4

127 Which of the following is polar
(1) p-dichlorobenzene (2) trans 1 chloropropene
(3) boron trifluoride (4) xenon tetra fluoride

128 Which molecule / ion out of the following does not contain unpaired electrons?
(1) N_2^+ (2) O_2 (3) O_2^- (4) B_2

129 Which of following molecule is having shortest bond length
(1) O_2 (2) O (3) O_3 (4) All have

S-BLOCK ELEMENTS

130 Which of the following isn't considered as alkaline earth metal?
(1) Be (2) Mg (3) Ca (4) Si

131 The alkali metals & their salts impart characteristic colour to an
(1) Oxidising flame (2) Reducing flame
(3) Both a & b (4) None of these

132 The pair of most abundant alkali metals is?
(1) Li & Na (2) Na & K
(3) K & Rb (4) Na & Rb

133 When alkali metals react with liquid ammonia the solution obtained is?
(1) Blue & non-Conducting
(2) Blue & Conducting
(3) Colourless & non-Conducting
(4) Colourless & Conducting

134. The products obtained on hydrolysis of superoxide
(1) $MO_2 + H_2O \longrightarrow M^+ + OH^- + H_2O_2$
(2) $MO_2 + H_2O \longrightarrow M^+ + OH^- + H_2O$
(3) $MO_2 + H_2O \longrightarrow M^+ + OH^- + H_2O_2 + O_2$
(4) $MO_2 + H_2O \longrightarrow M^+ + OH^-$

135 Milk of magnesia is:
(1) Suspension of $Mg(OH)_2$ in water
(2) Colloid of $Mg(OH)_2$ in water
(3) True solution of $Mg(OH)_2$ in water
(4) Pure $Mg(OH)_2$

136 The tendency to form halide hydrates in group 2 elements?
(1) increases down the group
(2) decreases down the group
(3) remains constant
(4) first decreases then increases down the group

137 For slowing down the process of setting of cement so that it gets sufficiently hard, the compound added is
(1) Limestone (2) dicalcium silicate
(3) Gypsum (4) Tricalcium aluminate

138 Which of the following alkali metal does not form ethyne on reaction with ethyne?
(1) Li (2) Na (3) K (4) Rb

139 Which of the following compound is thermally most stable?
(1) $LiNO_3$ (2) $NaNO_3$ (3) KNO_3 (4) $RbNO_3$

140 What is the order of relative degree of hydration
(1) $Cs^+(aq) > Rb^+(aq) > K^+(aq) > Na^+(aq) > Li^+(aq)$
(2) $Li^+(aq) > Na^+(aq) > K^+(aq) > Rb^+(aq) > Cs^+(aq)$
(3) $Na^+(aq) > K^+(aq) > Rb^+(aq) > Cs^+(aq) > Li^+(aq)$
(4) $Cs^+(aq) > Na^+(aq) > Rb^+(aq) > Li^+(aq) > K^+(aq)$

141. Least mobile ion is
(1) $[Be(H_2O)_n]^{+2}$ (2) $[Na(H_2O)_n]^+$
(3) $[Mg(H_2O)_n]$ (4) $[Li(H_2O)_n]^+$

142 Which is more soluble in water
(1) CaF_2 (2) BeF
(3) SrF_2 (4) BeF_2

143 A solid compound X on heating gives CO gas and residue when mixed with water it forms Y on passing excess of CO through Y in water a clear solution of Z is obtained. On boiling Z compound X is reformed compound X is
(1) $CaCO_3$ (2) Na_2CO_3
(3) K_2CO_3 (4) $Ca(HCO_3)_2$

144 An element of s-block forms oxide of MO type which is amphoteric in nature correct statetement regarding element is
(1) It's hydroxide is most soluble in its group hydroxides
(2) It forms peroxide
(3) Its sulphate is most soluble in its group sulphates
(4) Its carbonate is most stable in its group carbonates

145 Correct order is
(1) LiH < NaH < CsH → ionic character
(2) F-F < H-H < D-D → bond energy
(3) $NH_3 < H_2O < H_2O_2$ → acidic character
(4) all the above

146. Which of the following reacts with water most vigorously
(1) Na (2) Be (3) Li (4) Mg

147 Consider the following chemical reaction
$Z + 3LiAlH_4 \rightarrow X + 3LiF + 3AlF_3$
$X + HCl \rightarrow Y + 6H_2$
$3X + O_2 \xrightarrow{\Delta} B_2O_3 + 3H_2O$
X, Y, Z are respectively
(1) B, BF_3, H_3BO_3 (2) B_2H_6, BF_3, H_3BO_3
(3) B_2H_6, H_3BO_3, BF_3 (4) $Na_2B_4O_7$, B_2H_6

HYDROGEN

148. The hydride ion H^- is a stronger base than hydroxide ion which of the following reaction will occur if NaH is dissolved in water
(1) $H^-_{(aq)} + H_2O_{(\ell)} \rightarrow H_2O'_{(aq)}$
(2) $H^-_{(aq)} + H_2O_{(\ell)} \longrightarrow OH^-_{(aq)} + H_{2(g)}$
(3) $H^+_{(aq)} + H_2O_{(\ell)}$ → no reaction
(4) None of these

149 Hydrogen peroxide is reduced by
(1) Ozone
(2) Barium peroxide
(3) Acidic solution of $KMnO_4$
(4) Lead Sulphide

150 Water softening by Clarkes process uses
(1) Calcium bicarbonate
(2) Sodium bicarbonate
(3) Potash alum
(4) Calcium Hydroxide

151. Which of the following isotope of hydrogen is radioactive?
(1) $_1H^1$ (2) $_1H^2$ (3) H^3 (4) Both 2 & 3

152 Which reaction is not used in the preparation of H_2?
(1) Zn + NaOH → (2) Mg + NaOH →
(3) Al + NaOH → (4) Be + NaOH →

153. Which of the following is water gas shift reaction?
(1) $CO + H_2O \rightarrow CO_2 + H_2$
(2) $C + H_2O \rightarrow CO$
(3) $CO + O_2 \rightarrow CO_2$
(4) $CO + H_2 \rightarrow CH_3OH$

154 Which cannot be oxidised by H_2O_2?
(1) Na_2SO_3 (2) PbS
(3) KI (4) O_3

155 Which of the following reaction represents the oxidising property of H_2O_2?
(1) $KMnO_4 + H_2SO_4 + H_2O_2 \rightarrow K_2SO_4 + MnSO_4 + H_2O + O_2$
(2) $K_4[Fe(CN)_6] + KOH + H_2O_2 \rightarrow K_3[Fe(CN)_6] + H_2O + O_2$
(3) $PbO_2 + H_2O_2 \rightarrow PbO + H_2O + O_2$
(4) None of these

156 Permanent hardness can be removed by adding
(1) $CaCl_2$ (2) Na_2CO_3
(3) $CaOCl_2$ (4) K_2CO_3

157 Calgon used as water softner is?
(1) $Na_4P_2O_7$ (2) $Na_4P_2O_{10}$
(3) $Na_6P_4O_{13}$ (4) $Na_6P_6O_{18}$

158 Which is not present in clear hard water
(1) $Mg(HCO_3)_2$ (2) $CaCl_2$
(3) $MgSO_4$ (4) $MgCO_3$

159 Which is formed when calcium carbide reacts with heavy water
(1) C_2D_2 (2) CaD_2 (3) Ca_2D_2O (4) CD_2

COORDINATION COMPOUND

160. The correct IUPAC name of $[Pt(NH_3)_2Cl_2]$ is
(1) Diammine dichloridoplatinum (II)
(2) Diammine dichloridoplatinum (IV)
(3) Diamminedichloridoplatinum (0)
(4) Diammine dichloridoplatinum (IV)

161. When $CrCl_3.6H_2O$ is treated with excess of $AgNO_3$, 3 Mole AgCl are obtained. The formula of the complex is
(1) $[CrCl_3(H_2O)_3].3H_2O$
(2) $[CrCl(H_2O)_5]Cl_2.2H_2O$
(3) $[CrCl_2(H_2O)_4]Cl.2H_2O$
(4) $[Cr(H_2O)_6]Cl_3$

162. Indicate the complex on which shows geometrical isomerism
(1) $[Cr(H_2O)_4Cl_2]^+$ (2) $[Pt(NH_3)_3Cl]^+$
(3) $[Co(NH_3)_6]^{3+}$ (4) $[Co(CN)_5(NC)]^{3-}$

163 Which of the following options correct for $K_4[Fe(CN)_6]$ complex?
(1) d^2sp^3 Hybridisation and diamagnetic
(2) sp^3d^2 Hybridisation
(3) Paramagnetic
(4) None of these

164. Which of the following complex formed by Cu^{+2} ions is most stable?
(1) $Cu^{+2} + 4NH_3 \longrightarrow [Cu(NH_3)_4]^{+2}$
(2) $Cu^{+2} + 4CN^- \longrightarrow [Cu(CN)_4]^{-2}$
(3) $Cu^{+2} + 2en \longrightarrow [Cu(en)_2]^{+2}$
(4) $Cu^{+2} + 4H_2O \longrightarrow [Cu(H_2O)_4]^{+2}$

165. The compounds $[Co(SO_4)(NH_3)_5]Br$ and $[Co(SO_4)(NH_3)_5]Cl$ represent :-
(1) Linkage isomerism
(2) Ionisation isomerism
(3) Coordination isomerism
(4) no isomerism

166. Which of the following species is not expected to be a ligand?
(1) NO
(2) NH_4^+
(3) $H_2N - CH_2 - CH_2 - NH_2$
(4) CO

167. Which complex is optically active?
(1) $[Co(en)_3]^{+3}$
(2) trans – $[Co(en)_2Cl_2]^+$
(3) Cis – $[Co(en)_2Cl_2]^+$
(4) (1) and (3) both

168. Geometrical shapes of the complexes formed by the reaction of Ni^{+2} with Cl^-, CN^- and H_2O respectively are
(1) octahedral, tetrahedral and sq. planar
(2) Tetrahedral, sq. planar and octahedral
(3) Square planar, tetrahedral and octahedral
(4) octahedral, Square planar and tetrahedra

169. How many EDTA molecular are requried to make an octahedral complex with a Ca^{+2} ion?
(1) 1 (2) 3 (3) 4 (4) 2

170. For the Given complex $[Co(en)_2(NH_3)_2]^{+3}$, the number of Geometrical isomers, optical isomers and total number of isomers of all type possible respectively are
(1) 2, 2, 4 (2) 2, 2, 3 (3) 2, 0, 2 (4) 0, 2, 2

171. The value of effective atomic no. of Cr in $[Cr(NH_3)_6]Cl_3$ is
(1) 35 (2) 27 (3) 33 (4) 36

172. Formula of sodium Nitroprusside is?
(1) $Na_4[Fe(CN)_5NOS]$
(2) $Na_2[Fe(CN)_5NO]$
(3) $NaFe[Fe(CN)_6]$
(4) $Na_2[Fe(CN)_5NO_2]$

173. How many ions are produced from the complex $[Co(NH_3)_6]Cl_3$?
(1) 6 (2) 4 (3) 3 (4) 2

174. Ziegler - Natta catalyst is an organometallic compound of Metal?
(1) Fe (2) Zr (3) Rh (4) Ti

175. Which of the following is π acid ligand?
(1) NH_3 (2) CO (3) F (4) (en)

176. In Cu-ammonia complex the state of Hybridization of Cu^{+2} is
(1) sp^3 (2) spd^2 (3) sp^3d^2 (4) dsp^2

177. The value of n in the Carbonyl is
$(CO)_n - Co - Co - (CO)_4$
(1) 4 (2) 5 (3) 6 4) 8

178. Which of the following doesn't fo low effective Atomic Number Rule?
(1) $[Cu(NH_3)_4]^{+2}$ (2) $[Zn(OH_4)]^{-2}$
(3) $[HgI_4]^{2-}$ (4) $Fe(CO)_5$

179. Which complex has highest paramagnetism?
(1) $[Cr(H_2O)_6]^{+3}$ (2) $[Fe(H_2O)_6]^{+}$
(3) $[Cu(H_2O_{25})]^{+2}$ (4) $[Zn(H_2O)_6]^{+2}$

180. Same number of unpaired electron is observed in which of the following complexes
(a) $[MnCl_6]^{4-}$ (b) $[Fe(CN)_6]^{3-}$
(c) $[CoF_6]^{3-}$ (d) $[Ni(NH_3)]^{2+}$
(1) a and b (2) a & c
(3) b & d (4) c & d

181. Which of the following statement is correct about ethane 1,2 diamine?
(1) It is a neutral ligand
(2) It is a bidentate ligand
(3) It is a chelating ligand
(4) All of the above

182. Which is correctly matched

Compound	Total stereoisomer
(1) $[Co(en)_3]Cl_3$	3
(2) $[Co(en)_2Cl_2]Cl$	2
(3) $[Co(NH_3)_3Cl_3]$	2
(4) $[Pt(NH_3)_2Cl_2]$	3

183. Which of the following complex species is not expected to exhibit optical isomerism
(1) $[Co(en)(NH_3)_2Cl_2]$
(2) $[Co(en)_3]^{+3}$
(3) $[Co(en)_2Cl_2]^+$
(4) $[Co(NH_3)_3Cl_3]$

184 When excess of ammonia is added to $CuSO_4$ solution The deep blue colour complex is formed The complex is
(1) Tetrahedral & paramagnetic
(2) tetrahedral & diamagnetic
(3) square planar & diamagnetic
(4) square planar & paramagnetic

185 UPAC name of $[Pt(NH_3)_2Cl(NO_2)]$ is
(1) platinum diammonechloronitrite
(2) chloronitro-N-ammineplatinum( )
(3) Diammine chloridonitrito-N-Platinum(II)
(4) diamminechloronitrito-N-Platinum(II)

186 Which of the following have maximum number of isomers
(1) $[Co(NH_3)_4Cl_2]^+$ (2) $[Ni(en)(NH_3)_4]^+$
(3) $[Ni(C_2O_4)(en)_2]^0$ (4) $[Cr(SCN)_2(NH_3)_4]^+$

187. Which among the following can exhibit cis-trans isomerism
(1) $CoCl_3.4NH_3$ (2) $CoCl_3.6NH_3$
(3) $CoCl_3.5NH_3$ (4) All of these

188. Out of the following coordination entities which is chiral (optically active)
(1) $[Cr(H_2O)_3]^{3+}$
(2) trans$[CrCl_2(OX)_2]^{3-}$
(3) cis-$[CrCl_2(NH_3)_2]$
(4) cis-$[CrCl_2(OX)_2]^-$

189 Amongst the following the most stable compound is
(1) $[Fe(H_2O)_6]^{3+}$ (2) $[Fe(C_2O_4)_3]^{3-}$
(3) $[Fe(NH_3)_6]^{3+}$ (4) $[FeCl_6]^{3-}$

190 Which of the following is an organometallic compound
(1) cis-platin (2) Zeise salt
(3) Tollens reagent (4) Sodium nitroprusside

191 Which of the following system has maximum value of μ (only spin magnetic moment)?
(1) d^5 ($\Delta_0 > P$) (2) d^8 (tetrahedral)
(3) d^6 (high spin) (4) d^8 (octahedral)

192 The IUPAC name for $[Pt(NH_3)_3(Br)(NO_2)Cl]Cl$ is
(1) Triamminechlorobromonitro platinum(IV) chloride
(2) Triamminebromochloronitro platinum(IV) chloride
(3) Triammnechlorobromo platinum(IV) chloride
(4) Triamminechloronitrobromoplatinum(V) chloride

193 Which of the following cannot act as electrolyte
(1) $CoCl_3.6NH_3$ (2) $CoCl_3.5NH_3$
(3) $CoCl_3.4NH_3$ (4) $CoCl_3.3NH_3$

194 In brown ring complex, the oxidation state of iron will be
(1) +2 (2) +3 (3) +1 (4) 0

195 Hexafluoroferrate(III) ion is an outer orbital complex the number of unpaired electrons present in it is
(1) 1 (2) 5 (3) 4 (4) unpaired stable

196 Which of the following does not have optical isomer
(1) $[Co(en)_2C_2]$ (2) $[Co(NH_3)_4Cl_2]$
(3) $[Co(en)_2Cl_2]Cl$ (4) $[Co(en)(NH_3)_2Cl_2]Cl$

197 Among the following ions, which one has highest paramagnetism
(1) $[Cr(H_2O)_6]^{3+}$ (2) $[Fe(H_2O)_6]$
(3) $[Zn(H_2O)_6]^{2+}$ (4) $[Cu(H_2O)_6]$

198 The geometry of $Ni(CO)_4$ and $Ni(PPh_3)_2Cl_2$ are
(1) both are square planar
(2) tetrahedral and square planar
(3) both tetrahedral
(4) square planar and tetrahedral

199 Geometrical isomerism can be shown by
(1) $[Ag(CN)(NH_3)]$
(2) $Na_2[Co(NO_2)_4]$
(3) $[PtCl_4]^{2-}$
(4) $[PtCl(NH_3)_3][Au(CN)_4]$

200 Which of the following will give a pair of enantiomorphs
(1) $[Cr(NH_3)_6][Co(CN)_6]$
(2) $[Co(en)_2Cl_2]Cl$
(3) $[Pt(NH_3)_4][PtCl_6]$
(4) $[Co(NH_3)_4Cl_2]NO_2$

201 Which of the metals has most stable carbonate
(1) Na (2) Mg (3) Al (4) Si

202 Spin only magnetic moments of a d^4 ion in octahedral, square planar and tetrahedral complex, respectively are
(1) 2.8 BM, 0.4 BM 2.8 BM
(2) 2.8 BM 0 BM 2.8 BM
(3) 0 0 & 0 B.M.
(4) None of these

203 Among the following, the colored compound is
(1) $CuCl$ (2) $K_4[Fe(CN)_6]$
(3) CuF_2 (4) $(C_5H_5NH)_2CuCl_4$

204 $[NiCl_4]^{2-}$ and $[Ni(CN)_4]^{2-}$ resemble in
(1) geometry (2) magnetic moment
(3) hybridization (4) oxidation number

205 CFSE of high spin d^6 complex is
(1) $-0.6\ \Delta_o$ (2) 0
(3) $-1.6\ \Delta_o + P$ (4) $-2/5\ \Delta_o$

206 Total number of possible isomers of complex $[Pt(NH_3)_2(SCN)_2]$
(1) 2 (2) 4 (3) 3 (4) 6

207 When $CuSO_4$ reacts with excess of KCN, it forms a soluble complex which is
(1) $K_2[Cu(CN)_4]$ (2) $K_3[Cu(CN)_4]$
(3) $Cu(CN)_2$ (4) $Cu_2(CN)_2$

208 The IUPAC name for the [illegible] is
$(Pt(NH_3)_4(Br)(NO_2)]SO_4$
(1) Tetraamminebromidonitrito-N-platinum(IV) sulphate
(2) Tetraamminebromidonitrito-O-platinum(IV) sulphate
(3) Tetraamminebromidonitrito-N-platinum(IV) bromide
(4) [illegible]

209 When [illegible] reacts with excess of KCN, the complex formed is
(1) $K_4[Fe(CN)_6]$ (2) $Fe(CN)_3$
(3) $[Fe_4[Fe(CN)_6]_3]$ (4) [illegible]

210 Indicate the [illegible] which have [illegible] geometrical isomers is
(1) $[Cr(H_2O)_4Cl_2]^+$ (2) $[Pt(NH_3)_4]^{2+}$
(3) $Co(NH_3)_3Cl_3$ (4) [illegible]

211 When 1 mole of $CrCl_3 \cdot 6H_2O$ is treated with excess of $AgNO_3$, 3 mole of AgCl are obtained. The formula of the complex is
(1) $[Cr(H_2O)_6]Cl_3$
(2) $[Cr(H_2O)_5Cl]Cl_2 \cdot H_2O$
(3) $[Cr(H_2O)_4Cl_2]Cl \cdot 2H_2O$
(4) $[Cr(H_2O)_3Cl_3]$

212 A brown ring is formed at the junction of NO_3^- ion. It is due to formation of
(1) $Fe(H_2O)_5(NO)^{2+}$ (2) $FeSO_4NO$
(3) $[Fe(H_2O)_5NO]^{2+}$ (4) $FeSO_4(NO)_2$

213 The correct formula of diammine dichloridoplatinum(II) is
(1) $[Pt(Cl)_2(NH_3)_2]^{2+}$
(2) $[Pt(Cl)_2(NH_3)_2]$
(3) $[Pt(Cl)_2(NH_3)_4]$
(4) $[PtCl_2(NH_3)_2]^{2+}$

P BLOCK ELEMENTS

214 How many [illegible] oxygen atoms are present in P_4O_{10}?
(1) [illegible] (2) 14 (3) 2 (4) 5

215 Which [illegible] following phosphorus is the most reactive?
(1) Scarlet phosphorus (2) White phosphorus
(3) Red phosphorus (4) Violet phosphorus

216 Which of the following can be hydrolysed?
(1) PF_3 (2) NCl_3
(3) SF_6 (4) Both 1 & 2

217 Correct order of acid strength is
(1) $HClO < HClO_2 < HClO_3 < HClO_4$
(2) $HI < HClO < HClO_2 < HClO_4$
(3) $HClO_4 < HClO_2 < HClO_3 < HClO$
(4) $HClO_4 < HClO_3 < HClO_2 < HClO$

218 Which of the following is a sesquioxide?
(1) N_2O_3 (2) NO_2 (3) NO (4) N_2O

219 Allotropic form of sulphur which does not form during preparation of XeF_2
(1) XeF_4 (2) $XeOF_4$ (3) XeO_2F_2 (4) $XeOF_2$

220 Which is used in the [illegible] ?
(1) [illegible] and CaC_2 (2) $CaCl_2$ and Ca_3P_2
(3) [illegible] and Ca_3N_2 (4) CaC_2 and Ca_3P_2

221 N_2O is used as
(1) [illegible] (2) oxidising agent
(3) [illegible] (4) All

222 The [illegible] do not contain N–N linkage
(1) N_2O_5 (2) N_2O (3) N_2O_4 (4) N_2O_3

223 Bleaching action of SO_2 is due to
(1) [illegible] (2) oxidation
(3) [illegible] (4) acidic nature

224 [illegible]
(1) hydrolysis of [illegible] phosphine
(2) [illegible]
(3) reaction of P_4 & NaOH (conc.)
(4) All

225 A (black compound) $\xrightarrow{\text{halogen acid}}$ B (green yellow gas)

B(excess) $\xrightarrow{NH_3}$ C (unstable nitride)

Correct statement is

(1) C is PCl_3 (2) halogen acid is HI

(3) B is Cl_2 (4) A is $KMnO_4$

226 Beryl is a type of

(1) chain silicate (2) cyclic silicate

(3) sheet silicate (4) 3-D silicate

227 Order of pK_a

(1) HOCl > $HClO_2$ > $HClO_3$ > $HClO_4$

(2) $HClO_4$ > $HClO_3$ > $HClO_2$ > HOCl

(3) HOCl > $HClO_3$ > $HClO_4$ > HOCl

(4) $HClO_3$ > $HClO_2$ > HOCl > $HClO_4$

228. Which of the following compound will not give NH_3 on heating

(1) $(NH_4)_2SO_4$ (2) $(NH_4)_2CO_3$

(3) NH_4NO_2 (4) NH_4Cl

229. On hydrolysis CaC_2 gives a gas which on trimerisation gives

(1) C_2H_2 (2) C_6H_6

(3) C_2H_4 (4) C_3H_8

230. $P+Cl_2 \rightarrow A$, P + Excess $Cl_2 \rightarrow B$

Hydrolysis products of A and B are respectively

(1) H_3PO_2, H_3PO_3 (2) H_3PO_4, H_3PO_3

(3) H_3PO_3, H_3PO_4 (4) H_3PO_2, H_3PO_4

231. Which among the following order of given properties is incorrect

(1) HOCl > $HClO_2$ > $HClO_3$ > $HClO_4$ - oxidising nature

(2) Cl > F > Br > I - electron affinity

(3) Cl_2 > Br_2 > I_2 > F_2 bond dissociation energy

(4) HF < HCl < HBr < HI - acidic nature

232. Amongst the following the central atoms are directly bonded in

(1) N_2O_5 (2) $S_2O_5^{2-}$

(3) P_4O_{10} (4) Mn_2O

233 The chain length of silicones can be controlled by

(1) $(CH_3)_3SiCl$

(2) Addition of Cu powder

(3) Elevation of temperature

(4) None of these

234 Which of the following statement is incorrect regarding B_2H_6?

(1) On methylation it gives $B_2H(CH_3)_5$

(2) It has two 2e 3C bonds

(3) It has one 4e 4C bond

(4) It has four 2e 2C bonds

235 Red and white phosphorus are similar in

(1) smell (2) solubility in CS_2

(3) Hybridisation of P (4) Stability

236 Which of the following is strongest oxidising agent

(1) HOCl (2) $HClO_2$ (3) $HClO_3$ (4) $HClO_4$

237 In which species O-O bond is present

(1) $S_2O_8^{2-}$ (2) $S_4O_6^{2-}$ (3) SO_3 (4) S_2O_3

238. Glass is soluble in

(1) aqua regia (2) H_2SO_4

(3) HF (4) $HClO_4$

239 Paramagnetic oxide is

(1) NO (2) N_2O_4

(3) P_4O_6 (4) N_2O_5

240 Which oxide does not act as a reducing agent

(1) NO (2) NO_2

(3) N_2O (4) N_2O_3

241 Borax bead test is not given by

(1) An aluminium salt (2) A cobalt salt

(3) A copper salt (4) A nickel salt

242 The reaction showing endothermic nature and reduction of halogen is

(1) $F_2 + \frac{1}{2}O_2 \rightarrow F_2O$

(2) $Cl_2 + O_2 \rightarrow Cl_2O$

(3) $F_2 + H_2O \rightarrow 2HF + \frac{1}{2}O_2$

(4) None of the above

243 In which of the following oxy acid of sulphur sulphur atoms has different oxidation states

(1) $H_2S_4O_6$ (2) $H_2S_2O_8$ (3) $H_2S_2O_4$ (4) $H_2S_2O_3$

244 Which of the following is most acidic?

(1) Cl_2O_7 (2) SO_2 (3) P_2O_5 (4) SiO

245 Which of the following is not peroxide

(1) Na_2O_2 (2) CaO_2

(3) PbO (4) H_2O_2

246 In which of the reaction phosphine is not obtained as product

(1) $Ca_3P_2 + HCl \longrightarrow$ (2) $P_4 + NaOH \rightarrow$

(3) $H_3PO_3 \rightarrow$ (4) $H_3PO_2 \rightarrow$

247 Correct statement about boric acid is
(1) boron is sp^3 hybridised
(2) boric acid is triprotic acid
(3) it is used in treatement of eye infection
(4) It forms covalent network ing

248. Which of the following oxide is acidic in nature?
(1) B_2O_3 (2) Al_2O_3 (3) Ga_2O_3 (4) In_2O_3

249 The most commonly used reducing agent is
(1) $AlCl_3$ (2) $PbCl_2$ (3) $SnCl_4$ (4) $SnCl_2$

250 Which of the following are peroxy acid of sulphur
(1) H_2SO_5 and $H_2S_2O_8$
(2) H_2SO_5 and $H_2S_2O_7$
(3) $H_2S_2O_3$ and $H_2S_2O_8$
(4) $H_2S_2O_6$ and H_2S_4O

251. The element forms neutral as well as acidic oxide is -
(1) Sn (2) Si (3) C (4) P

252. P_4O_{10} has short and long P–O bonds. The number of short P–O bonds in this compound is -
(1) 1 (2) 2 (3) 3 (4) 4

253 Nitrogen dioxide can be obtained by heating.
(1) KNO_3 (2) $Pb(NO_3)_2$
(3) NH_4NO_3 (4) All of these

254 98% H_2SO_4 is
(1) Pyrosulphuric acid (2) Oleum
(3) Azeotropic mixture (4) None of these

255 Which oxide is more acidic
(1) Al_2O_3 (2) Na_2O (3) MgO (4) CaO

256 C_3O_2 is an anhydride of
(1) HCO_3
(2) $HClO_2$
(3) $HClO_4$
(4) Mixed anhydride of $HClO_3$ & $HClO_4$

257 Carbogen is a mixture of
(1) O_2 & H_2 (2) CO_2 & O_2
(3) O & Air (4) O_2 & Ne

258 A black sulphide when treated with ozone becomes white. the white compound is
(1) $ZnSO_4$ (2) $CaSO_4$
(3) $BaSO_4$ (4) $PbSO_4$

259 An example of tetrabasic acid is
(1) Orthophosphorus acid
(2) Orthophosphoric acid
(3) Metaphosphoric acid
(4) Pyrophosphoric acid

260 The reducing power of divalent species decreases in the order is
(1) Ge > Sn > Pb (2) Sn > Ge > Pb
(3) Pb > Sn > Ge (4) None of these

261 Basicity of Phosphinic Acid is
(1) 1 (2) 2 (3) 3 (4) 4

262 Empirical formula of Bleaching powder is
(1) $Ca(OH)_2$ (2) $CaOCl_2$
(3) $Ca(OCl)_2$ (4) $CaClO_4$

d and f-ELEMENTS

263 Which of the following change is possible in Aqueous Medium-
(1) $2Cu^+ \longrightarrow Cu^{2+} + Cu^0$
(2) $2Cu^0 \xrightarrow{\Delta} Cu^+ + Cu^{+2}$
(3) $2Cu^{+} \rightarrow Cu^{+2} + Cu^{+}$
(4) $Cu^{+2} + e^- \longrightarrow Cu^+$

264. Titanium can show which oxidation states
(1) +2, +3 & +4 (2) Only +3
(3) +2 & +3 (4) Only +2

265 Vanadium ion is Related to
(1) Mn^{+2}, Cr^{+3} & V^{+5} (2) Sc^{+3}, V^{+4} & Cr^{+2}
(3) Zn^{+2}, Mn^{+3} & Fe^{+3} (4) Ti^{+4}, V^{+4} & Mn^{+3}

266 Ferric ion + Mono valent anion $\longrightarrow$ x + y
element, having atomic Number 53
x & y are
(1) Fe^0 & Iodate ion (2) Fe & Periodate ion
(3) Fe^{+3} & I_2 (4) Fe^{+3} & FeI_3

267 Pr, Nd, Tb & Dy show +4 oxidation state in form of-
(1) Chromates & Halides
(2) Manganate & Chromate
(3) Both of the above
(4) Oxide

268 Electronic configurations Related to Praseodymium, Neodymium & Promethium are Respectively
(1) $4f^1 6s^2$, $4f^4 6s^2$ & $4f^5 6s^2$
(2) $4f^1 6s^2$, $4f^4 6s^2$ & $4f^5 6s^2$
(3) $4f^1 6s^2$, $4f^4 6s^2$ & $4f^5 6s^2$
(4) $4f^{14} 5d^1 6s^2$, $4f^4 6s^2$ & $4f^5 6s^2$

269 Which Products are formed (Respectively) by Reaction of Lanthanoids with Hydrogen oxide, burns in O_2 and Heated with Sulphur
(1) $Ln(OH)_3$, Ln_2O_3, Ln_2S_3
(2) $Ln \cdot xH_2O$ Ln O_2 & Hetero cyclic Sulphides
(3) Ln_2O_3 $Ln(OH)$ & LnS
(4) Macrocyclic ligands containing OH ions, LnO & Homo cyclic sulphides

270 Catalyst Related to Polymerisation of Monomers having Two carbon atoms having one double bond
(1) V_2O_5 + Asbestos + $TiCl_4$
(2) Zeolite + Feldspar
(3) $TiCl_4$ + Tri Methyl Aluminium
(4) MnO_2 + $KMnO_4$ + $PdCl_2$

271 Elements of 4f series can form with Carbon–
(1) Ln_3C & LnC_2 (2) Ln_2C_3 & LnC_3
(3) LnC_3 & Ln_3C (4) All of the above

272 Most of the Metals in Mischmeta are Related to
(1) Metals of d-block
(2) Lanthanoids
(3) Actinoids
(4) Actinoids & d-block metals both

273 What is incorrect about the reactions of $KMnO_4$ and oxalic acid
(1) CO_2 is formed
(2) decolourisation is fast in begining but become slow after some time
(3) Mn^{2+} is autocatalyst
(4) It is a redox change

274 Which statement is correct
(1) Most common oxidation state of lanthanoid is +2
(2) HCl can be used to acidify $KMnO_4$ during redox reaction
(3) In presence of CO_2, orange dichromate solution changes to yellow chromate
(4) To separate Fe_2O_3 and Al_2O_3, NaOH can be used

275 On addition of small amount of $KMnO_4$ to concentrated H_2SO_4, a green oily compound is obtained which is highly explosive in nature the compound is
(1) Mn_2O_7 (2) MnO_2 (3) $MnSO_4$ (4) Mn_2O_3

276 $CrO_4^{2-} \underset{H^+,\ Y}{\overset{pH=X}{\rightleftharpoons}} Cr_2O_7^{2-}$
The pH values of (X) and (Y) are respectively
(1) 4 and 5 (2) 4 and 8
(3) 8 and 4 (4) 8 and 9

277 Which of the following is the strongest oxidizing agent
(1) Mn^{2+} (2) Zn^{2+} (3) Ni (4) Cu^{2+}

278 Spegeleisen is an alloy of
(1) Fe and Mn (2) Fe, Mn & C
(3) Fe, Mn & Cr (4) Fe and Cr

279 The product of oxidation of I^- with MnO_4^- in alkaline medium is
(1) IO_3^- (2) I_2 (3) IO (4) IO_4^-

280 The transition element of 3d series which does not show variable oxidation state
(1) Zn (2) Cu (3) Cr (4) Cd

METALLURGY

281 In which of the following metallurgy self reduction is not possible
(1) ZnS → Zn (2) PbS → Pb
(3) Cu_2S → Cu (4) HgS → Hg

282 Which reaction(s) occurs during calcination
(a) $CaCO_3 \longrightarrow CaO + CO_2$
(b) $2FeS_2 + \frac{11}{2}O_2 \rightarrow Fe_2O_3 + 4SO_2$
(c) $Al_2O_3 \cdot xH_2O \longrightarrow Al_2O_3 + xH_2O$
(d) $ZnS + \frac{3}{2}O_2 \rightarrow ZnO + SO_2$
correct option are
(1) a and b (2) b and c
(3) a and c (4) b and d

283 Copper matte contains
(1) Cu_2S + FeS (2) Cu_2O + FeO
(3) Cu_2S + ZnS (4) Cu_2S + HgS

284 During the extraction of Ag and Au using a KCN solution and Zn cyanide ions and Zn react with metal ion as respectively
(1) a reducing Agent an oxidising Agent
(2) a complexing Agent a reducing Agent
(3) an oxidising Agent a complexing Agent
(4) a reducing Agent, a complexing Agent

285 Match the column

Column-	Column-
(a) Zone Refining	(P) Ge, Si, Ga
(b) Mond Process	(Q) Cu
(c) Van arkel Method	(R) Zr, Ti
(d) Electrolytic refining	(S) Ni

(1) (a) P (b) S (c) R (d) Q
(2) (a) S (b) Q (c) P (d) R
(3) (a) R (b) Q (c) P (d) S
(4) (a) Q (b) R (c) P (d) S

286 Match the column

Column – I	Column – I
(a) Copper pyrites	(P) $ZnCO_3$
(b) Malachite	(Q) $CuCO_3 \cdot Cu(OH)_2$
(c) Calamine	(R) $CuFeS_2$
(d) Sphalerite	(S) ZnS

(1) (a) Q (b) R (c) S (d) P
(2) (a) R (b) Q (c) P (d) S
(3) (a) P (b) Q (c) R (d) S
(4) (a) S (b) P (c) R (d) Q

287. In the extraction of copper metal is formed in the bessemer converter due to reaction.

(1) $Cu_2S + 2Cu_2O \longrightarrow 6Cu + SO_2$
(2) $Cu_2S \longrightarrow 2Cu + S$
(3) $Fe + Cu_2O \longrightarrow 2Cu + FeO$
(4) $2Cu_2O \longrightarrow 4Cu + O_2$

288. Sheelite ($CaWO_4$) is an ore of tungsten which contain tungestate ion, Tungestate ion is also present in

(1) Limonite (2) Dolomite
(3) Wolframite (4) Siderite

289. Which of the following pair is incorrectly matched

(1) Kroll's Process - Titanium
(2) Froth floatation – Cerussite
(3) distillation – Zinc
(4) dipressants – NaCN

290 Which of the following metals cannot be extracted by carbon reduction process?

(1) Pb (2) Al (3) Hg (4) Zn

291. (i) A (Allotrophous solid) $\xrightarrow{O_2,\ air}$ B $\xrightarrow[\text{water}]{\text{lime}}$ milky

(ii) Metal sulphide $\xrightarrow{\text{roasting}}$ B (gas) $\xrightarrow{KMnO_4/H^+}$ decolorisation of $KMnO_4$

(iii) B (gas) $\xrightarrow{Fe}$ Fe^{2+}

Correct statement is

(1) A is FeO (2) B is CO
(3) B is SO_2 (4) A is ZnS

292 Correct match is

Purification by	Method
(1) Zr	Poling
(2) Zn	Van arkel
(3) N	distillation
(4) Ge	Zone refining

293 Extraction of silver from argentiferous lead is done by

(1) Parkes process
(2) Serpeck process
(3) Down's process
(4) Castner-Kellener process

294. Thermite is a mixture of

(1) Zn + Mg (2) Fe + Al
(3) Fe_2O_3 + Al (4) Cu + Mg

295. Sulphide ore is

(1) copper pyrites (2) malachite
(3) haematite (4) magnesite

296. Which of the following term is not related to Al extraction

(1) Serpeck's process
(2) Hall - Heroult process
(3) Thermite process
(4) Hoop's process

297. Which of the following metal is leached by cyanide process

(1) Ag (2) Na
(3) Al (4) Cu

298 Which of the following is concentrated by froth-floatation method?

(1) cassiterite (2) magnetite
(3) melachite (4) galena

299 List-I List-II

(a) cyanide process	(P) Ultra pure Ge
(b) Froth floatation process	(Q) Pine oil
(c) electrolytic reduction	(R) extraction of Al
(d) Zone refining	(S) extraction of Au

	a	b	c	d
(1)	R	P	S	Q
(2)	S	Q	R	P
(3)	R	Q	S	P
(4)	S	P	R	Q

300 In extraction of copper from its sulphide ore, the metal is formed by the reduction of Cu_2O with

(1) FeS (2) CO
(3) Cu_2S (4) SO

INORGANIC CHEMISTRY — ANSWER KEY

Que.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Ans	2	1	4	3	1	1	2	2	3	1	3	2	4	4	4
Que.	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
Ans	4	1	2	4	3	2	2	1	2	1	2	2	3	2	2
Que.	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
Ans	4	4	1	3	2	1	2	1	2	3	2	4	2	1	3
Que.	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
Ans	1	1	1	1	1	3	3	1	2	2	2	1	2	3	2
Que.	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75
Ans	1	1	1	3	2	4	3	1	3	2	3	3	2	2	1
Que.	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90
Ans	4	1	4	4	1	3	2	3	4	4	2	3	2	2	3
Que.	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105
Ans.	2	3	3	2	1	3	4	3	3	2	4	3	2	4	1
Que.	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120
Ans	1	2	4	4	2	2	1	4	2	1	3	4	1	2	3
Que.	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135
Ans.	3	3	4	4	3	4	2	3	1	1	1	2	2	3	1
Que.	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150
Ans	2	3	1	4	2	1	4	1	3	4	1	3	2	4	4
Que.	151	152	153	154	155	156	157	158	159	160	161	162	163	164	165
Ans.	3	2	1	4	4	2	1	4	1	1	4	1	1	3	4
Que.	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180
Ans.	2	4	2	1	2	3	2	3	4	2	4	1	1	2	2
Que.	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195
Ans.	4	3	4	4	3	4	1	4	2	2	3	2	4	3	2
Que.	196	197	198	199	200	201	202	203	204	205	206	207	208	209	210
Ans.	2	2	3	3	2	1	2	3	4	1	4	2	4	2	1
Que.	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225
Ans	4	1	4	1	2	4	2	2	4	4	4	4	1	4	3
Que.	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240
Ans.	2	1	3	2	3	3	2	1	1,3	3	1	1	3	1	4
Que.	241	242	243	244	245	246	247	248	249	250	251	252	253	254	255
Ans	1	1	1	1	3	3	3	1	4	1	3	4	2	3	1
Que.	256	257	258	259	260	261	262	263	264	265	266	267	268	269	270
Ans	4	2	4	4	1	1	2	1	1	1	3	4	3	1	3
Que.	271	272	273	274	275	276	277	278	279	280	281	282	283	284	285
Ans.	1	2	2	4	1	2	4	2	1	1	1	3	1	2	1
Que.	286	287	288	289	290	291	292	293	294	295	296	297	298	299	300
Ans.	2	1	3	2	2	3	4	1	3	1	3	1	4	2	3

INORGANIC CHEMISTRY SOLUTIONS

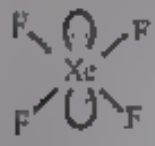
4		Na	Mg	Si
IE	496	737	786 Al? (KJ/mol)

E order → Na < Al < Mg < Si
due to Penetration
496 < A 737 < 786
A. = 575 KJ/mol

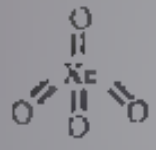
14 Radius order
B < A. = Ga < In = Tl
due to Transition Contraction; due Lanthanide Contraction

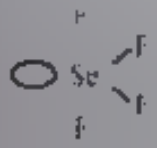
20 $Cr = 4S^1 3d^5$
no. of U.P e⁻ = 6

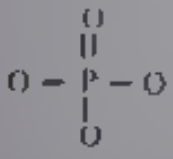
48 XeF_4 = 4 σ + 2 lp
= square planar

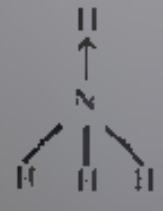


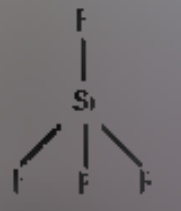
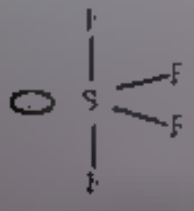
μ = 0 Non polar and planar

58. XeO_4  Tetrahedral

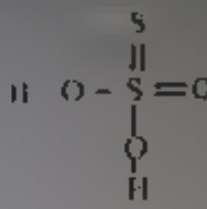
SeO_2  see saw shape

PO  Tetrahedral

NH_3  Tetrahedral

66  Tetrahedral  see saw

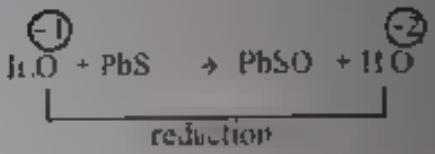
$H_2S_2O_7$ 190

74 

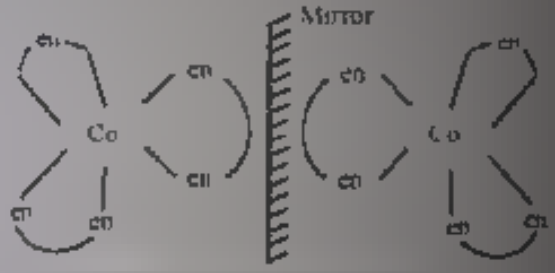
6 σ & 2 π 7 σ & 2 π

87 For O_2 molecule the last 2e⁻ enter in A.B.M.O
$\pi 2P^1 x = \pi^* 2P y$

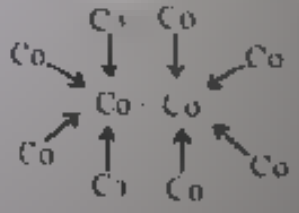
$$B.O. = \frac{1}{2}[N_b - N_a]$$

149 

152 Zn, Al & Be are amphoteric, hence react with NaOH to release H_2 whereas Mg does not

167 $[Co(en)_3]^{3+}$ 

$[Co(en)_3]^{3+}$ show optical isomer

177 

Co = Z → 27
Number of co-ord nate bond → 4
Number of delta bond → 1
So value of n in $(Co)_n$ Co Co - $(Co)_n$ = 4

283 Copper matte contains $Cu_2S + FeS$

285 Zone Refining Ge Si Ga
Mond Process Ni
Van arkel Method Zr Ti
Electrolytic refining - Cu

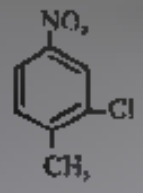
287 Extraction of copper in bessemer convertor
$Cu_2S + 2Cu_2O \rightarrow 6Cu + SO_2$

289 Kroll's Process Mg
Froth Floatation – Cerussite
Distillation Zn
Depressants – NaCN

ORGANIC CHEMISTRY

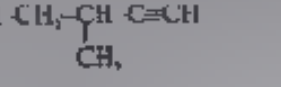
NOMENCLATURE

1 IUPAC Name of following compound is.



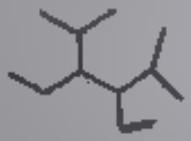
(1) 4-Methyl-5-Chloro-nitrobenzene
(2) 2-Chloro-1-methyl-4-nitrobenzene
(3) 1 Chloro-2 methyl 5-nitrobenzene
(4) 1-Methyl-2-chloro-4 nitrobenzene

2. IUPAC Name for following compound



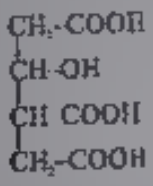
(1) 4-Methyl hex-1-en-5 yne
(2) 3-Methyl hex-5-en-1-yne
(3) 4-Ethynyl Pent-1-ene
(4) 2-Ethynyl Pent-4-ene

3. IUPAC Name for given comp:



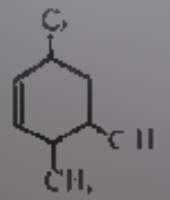
(1) 3-Ethyl-4-isopropyl hexa-1-ene
(2) 3, 4-Diisopropyl hexa-1-ene
(3) 4-Ethyl-3-isopropyl-5-methyl hex-1-ene
(4) 3-Ethyl-4-isopropyl-2-methyl hex-5-ene

4 UPAC Name for given comp



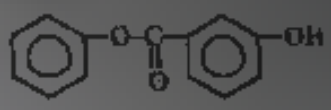
(1) 3-Hydroxy butane-1, 3, 5-troic acid
(2) 3-Hydroxy-4-carboxy hexan-1, 6- dioic acid
(3) 2-Hydroxy butane-1,3,4-tricarboxylic acid
(4) 3-Hydroxy butane-1,2,4 tricarboxylic acid

5. UPAC Name of



(1) 3-Chloro-5-Ethyl-5 methyl cyclohex-1-ene
(2) 2 Chloro-4-Ethyl-5-methyl cyclohexene
(3) 6 Chloro-4 Ethyl-3-methyl cyclohex-1-ene
(4) 5-Chloro-3-Ethyl-2 methyl cyclohex-1-ene

6. IUPAC Name of



(1) Phenyl m-hydroxy benzoate
(2) 3 Phenoxy carbonyl phenol
(3) Phenyl-3 hydroxy benzoate
(4) None of these

7 Which of the following is incorrectly matched

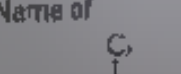
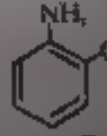
Common name	*IUPAC name*
(1) Croton aldehyde	But-2-enal
(2) Cinnamic acid	3-Phenyl prop-2-enoic acid
(3) Lactic acid	2-Hydroxy propanoic acid
(4) Acrylonitrile	But-2-enenitrile

8. IUPAC name of $(CCl_3)_3CCl$ is-
(1) tris - trichloromethyl-1-chloro methane
(2) 2-Chloro-2-trischloromethyl propane
(3) 1,1,1,2,3,3,3-Heptachloro-2-trichloromethyl propane
(4) 1, 1, 1-trichloromethyl-1-chloro methane

9. IUPAC Name of

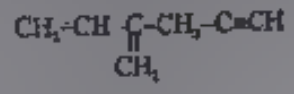
(1) P-bromoaniline
(2) 4-Bromobenzenamine
(3) 4-Bromoaniline
(4) Both (2) & (3)

10. IUPAC Name of propiophenone
(1) Ethyl phenyl methanone
(2) 1-Phenyl propan-1-one
(3) 3-Phenyl propanone
(4) None of these

11 Incorrectly matched with their common names
(1)  β-Bromobutyraldehyde
(2) Isovaleric acid
(3)  o-Toluidine
(4) $NH_2-CH_2-CH=CH_2$ Allylamine

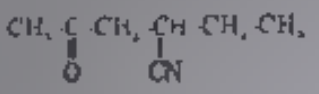
12 IUPAC Name for
$(CH_3)_2C(C_2H_5)_2$
(1) Diethyl dimenthyl methane
(2) 2-Ethyl-2-methyl butane
(3) 3,3-Dimethyl pentane
(4) None of these

13 IUPAC Name of



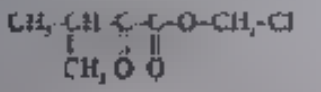
(1) 2-Propynyl buta-1, 2-diene
(2) 4-Methylene hex-5-en-1-yne
(3) 3-Methylene hex-1-en-5-yne
(4) 2-Vinyl pent-1-en-4-yne

14 IUPAC Name of the given compound



(1) 4-Cyano hex-2-one
(2) 2-Ethyl-4-oxo Pentane nitrile
(3) 2-Oxo-4-cyano hexane
(4) 2-Oxo- hexane-4-nitrile

15. IUPAC Name for given compound



(1) Chloromethyl, 2-oxo-3-methyl butanoate
(2) 1-Chloromethoxy-3-methyl butan-1,2-dione
(3) 2-Methyl-3-oxo-1-chloromethyl butanoate
(4) None of these

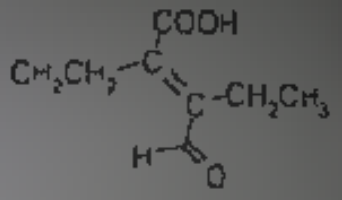
16. IUPAC name of the following compound is
$CH_3-CH=CH-CH_2-C\equiv CH$
(1) Hex-2-en-5-yne (2) Hex-5-yn-2-ene
(3) Hex-4-en-1-yne (4) Hex-1-yn-4-ene

17. IUPAC name of given compound is

(1) 1,3-Dimethyl hex-4-ene-1-ol
(2) 4,6-Dimethyl hex-2-en-6-ol
(3) 4-Methyl hept-2-en-6-ol
(4) 4-Methyl hept-5-en-2-ol

18. Which of the following IUPAC name is incorrect
(1) 3-Bromo-2-chloropentane
(2) Pent-2-en-4-yne
(3) 3-Bromo-butan-2-ol
(4) 1-Aminopentane-2-thio

19. Number of carbon in parent carbon chain of the following compound

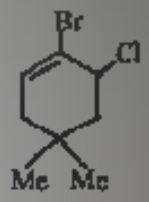


(1) 4 (2) 5 (3) 6 (4) 3

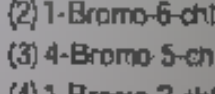
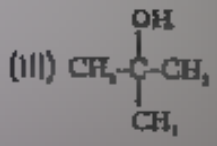
ISOMERISM

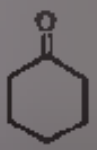
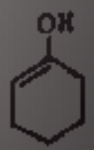
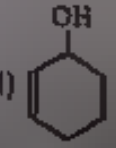
20 How many cyclic structural isomers of C_4H_8 are possible.
(1) 5 (2) 3
(3) 4 (4) 6

21 The correct IUPAC name of following compound is



(1) 2-Bromo-3-chloro-5,5-dimethyl cyclohex-1-ene
(2) 1-Bromo-6-chloro-4,4-dimenthyl cyclohex-1-ene
(3) 4-Bromo-5-chloro-1,1-dimethyl cyclohex-1-ene
(4) 1-Bromo-2-chloro-4,4-dimenthyl cyclohex-1-ene

22 Among these chain isomers are
(I) $CH_3-CH_2-CH_2-CH_2-OH$
(II) 
(III) 
(1) I only (2) I and III only
(3) I and II both (4) None of these

23. Tautomer of I is
(I) 
( ) 
(III) 
(1) II (2) III
(3) Both II and III (4) None of these

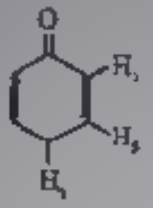
24. Number of structural isomers possible from molecular formula C_3H_6O?
(1) 7 (2) 5 (3) 9 (4) 10

25. Number of structural isomers possible from molecular formula C_4H_8 is
(1) 7 (2) 8 (3) 9 (4) 10

26. The number of structural isomers possible from molecular formula C_3H_7N?
(1) 2 (2) 3 (3) 4 (4) 5

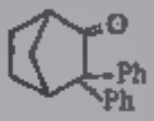
27. The number of esters possible from molecular formula $C_4H_8O_2$ is
(1) 5 (2) 6 (3) 8 (4) 4

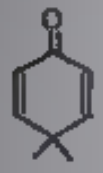
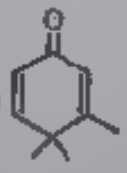
28. This molecule can be enolized involving:



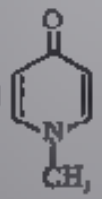
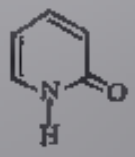
(1) H_α (2) H_β
(3) H_γ (4) Cannot be enolized

29. Which of the following can exhibit tautomerism

(1)  (2) 

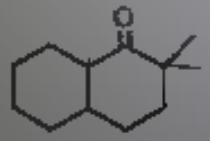
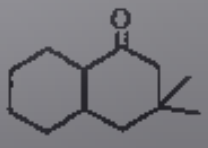
(3)  (4) 

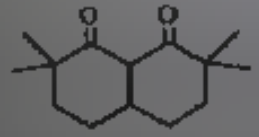
30. Which among these can exhibit tautomerism?

(a)  (b)  (c) 

(1) a only (2) b only
(3) c only (4) a and c

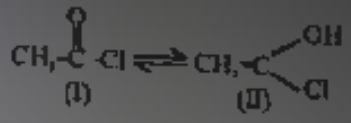
31. Which of following can exhibit tautomerism?

(a)  (b) 

(c) 

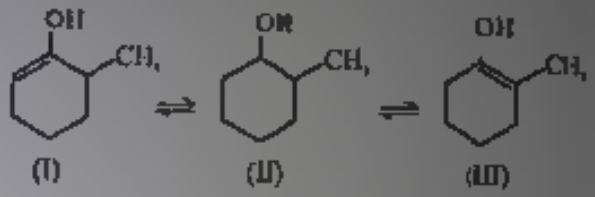
(1) a only (2) b only
(3) c only (4) All of these

32. Which tautomer isomer is more stable



(1) (I)
(2) (II)
(3) (I) = (II)
(4) None of these

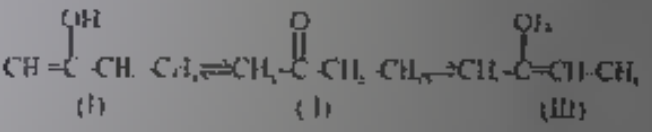
33. Stability order of these tautomer is



(I) (II) (III)

(1) (III) > (II) > (I)
(2) (III) > (II) > (I)
(3) (II) > (I) > (III)
(4) (III) > (II) > (I)

34. Stability order among these tautomer is.

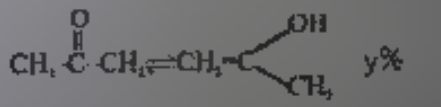


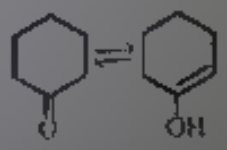
(I) (II) (III)

(1) (I) > (II) > (III)
(2) (II) > (I) > (III)
(3) (III) > (II) > (I)
(4) (III) > (II) > (I)

35. The relation between the enol contents x, y and z should be in acidic medium

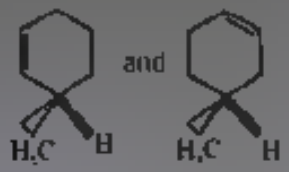
$CH_3CHO \rightleftharpoons CH = CH-OH$ x%

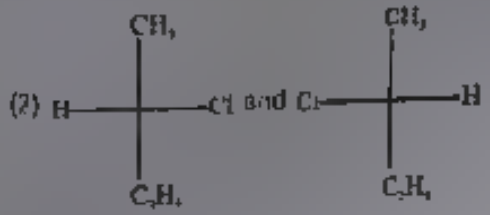
 y%

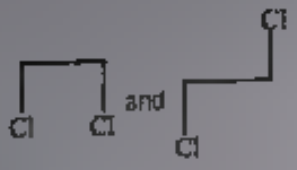
 z%

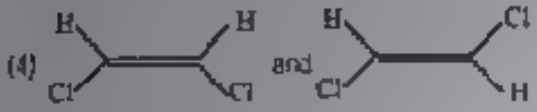
(1) x > y > z (2) z > y > x
(3) y > x > z (4) y > z > x

36 Which of the following pairs of isomers represents a pair of conformational isomers?

(1)  and

(2) 

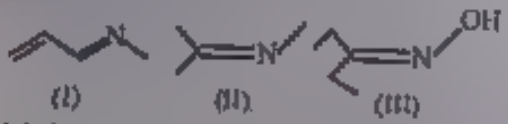
(3)  and

(4) 

37. Geometrical isomers are:
(1) Structural isomers
(2) Conformational isomers
(3) Configurational isomers
(4) None of these

38. Which of the following compound will exhibit geometrical isomerism?
(1) $CH_2=CH-CH=CH_2$
(2) $CH_3-CH=CH-CH=CH-CH_3$
(3) $CH_2=CH-CH_2-CH=CH_2$
(4) $CH_2=CH-C\equiv C-CH=CH_2$

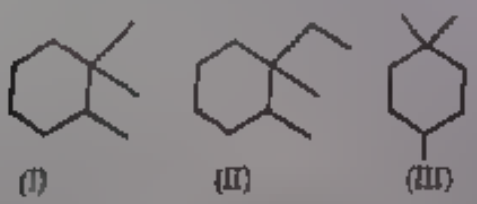
39. Which of these will exhibit geometrical isomerism?



(I) (II) (III)

(1) I (2) II
(3) III (4) I and I

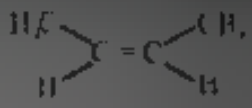
40. Which of these will exhibit geometrical isomerism?



(I) (II) (III)

(1) I (2) II
(3) III (4) All of these

41 This compound can be named as

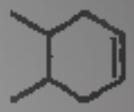


(1) Cis -2 butene (2) (Z)-2 butene
(3) (1) and (2) (4) R-2 butene

42 How many geometrical isomers of this compound are possible?

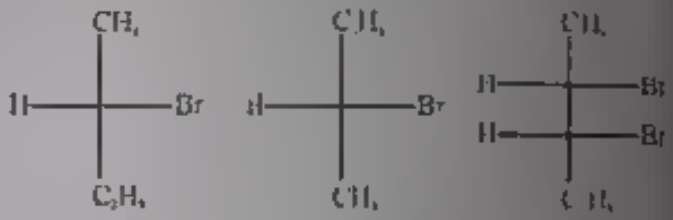
(1) 0 (2) 2 (3) 3 (4) 4

43 How many geometrical isomers of this compound are possible



(1) 0 (2) 2 (3) 3 4) 4

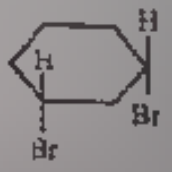
44 Which of these molecule is optically active?

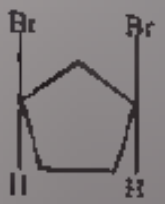


(I) (II) (III)

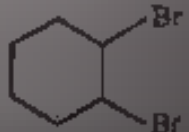
(1) (2) I
(3) II (4) All of these

45 Which of the following compounds can be non-superimposable mirror images?

(1)  (2) 

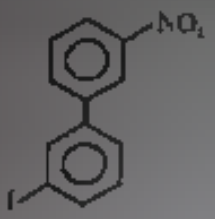
(3)  (4) All of these

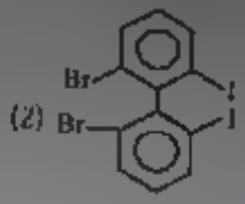
46 How many stereoisomers are possible in this compound?

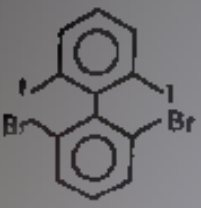


(1) 2 (2) 3 (3) 4 (4) 5

47 Which of the following biphenyl is optical active

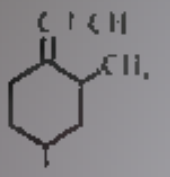
(1) 

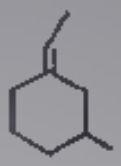
(2) 

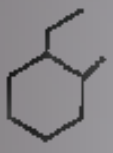
(3) 

(4) None

48 Which of the following is optically active

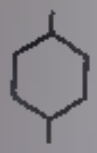
(1) 

(2) 

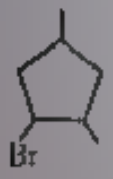
(3) 

(4) All of these

49 Which of the following can be a meso compound?

(1) 

(2) 

(3) 

(4) All of these

50. Most stable conformation of n-butane is.

(1) Fully eclipsed (2) Staggered

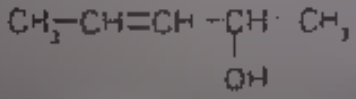
(3) Partially eclipsed (4) Gauche

51 Which of the following can show conformation isomerism.

(1) CD_3I (2) $CH_2(OH)CH_2OH$

(3) NH_4 (4) All of these

52 Number of stereoisomers of the given compound is

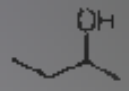


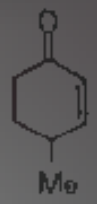
(1) 2 (2) 3 (3) 4 (4) 6

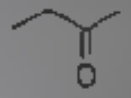
53 How many structures of aldehydes are possible for molecular formula $C_5H_{10}O$?

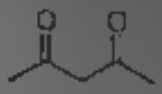
(1) 4 (2) 7 (3) 6 (4) 8

54 Which of the following can show both tautomerism and optical isomerism

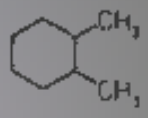
(1) 

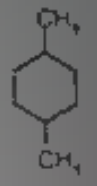
(2) 

(3) 

(4) 

55. Which of the following compound will not show optical isomerism

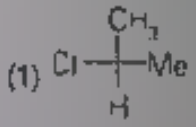
(1) 

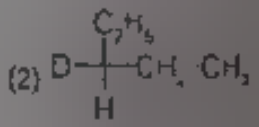
(2) 

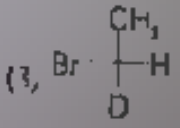
(3) 

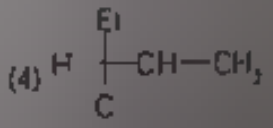
(4) all of these

56 Which of the following molecule has non-superimposible mirror images?

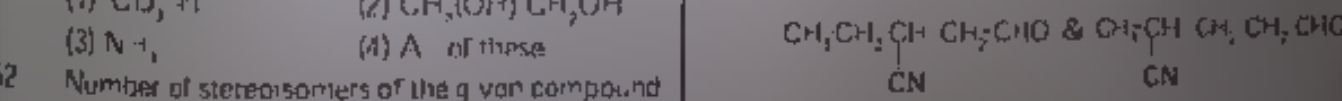
(1) 

(2) 

(3) 

(4) 

57 What is relation between following compounds



(1) positional isomers

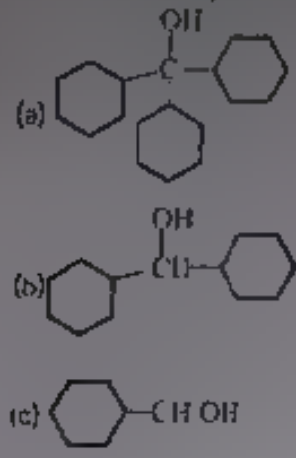
(2) chain isomers

(3) optical isomers

(4) metamers

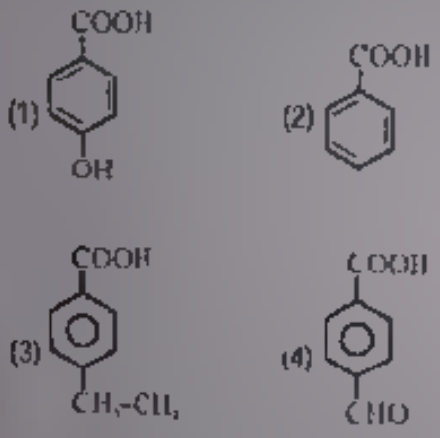
GOC-I

58 Correct order of pKa is



(1) 3 > 2 > 1 (2) 2 > 3 > 1
(3) 1 > 2 > 3 (4) 1 > 3 > 2

59. Correct order of acidic strength

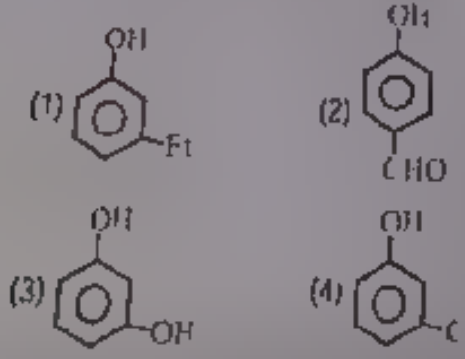


(1) 1 > 2 > 3 > 4 (2) 4 > 3 > 2 > 1
(3) 4 > 2 > 3 > 1 (4) 2 > 4 > 3 > 1

60. K_a increases in benzoic acid if substituent X bonded at para position then X is

(1) $-OCH_3$ (2) $-CH_3$
(3) $-CN$ (4) $-NH_2$

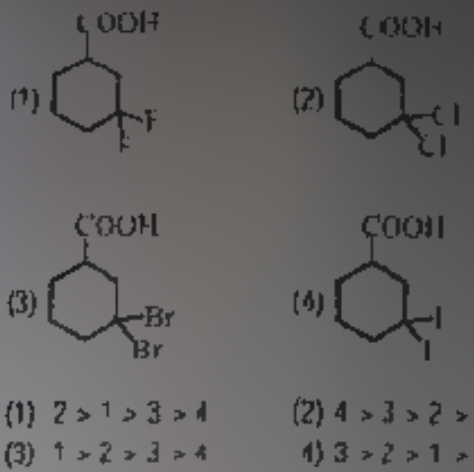
61



Decreasing order of pKa is

(1) 1 > 2 > 3 > 4 (2) 1 > 3 > 4 > 2
(3) 2 > 4 > 1 > 3 (4) 4 > 3 > 2 > 1

62 Which of the following present the correct order of acidity in the given compound



(1) 2 > 1 > 3 > 4 (2) 4 > 3 > 2 >
(3) 1 > 2 > 3 > 4 4) 3 > 2 > 1 > 4

63 The correct order of K_a is

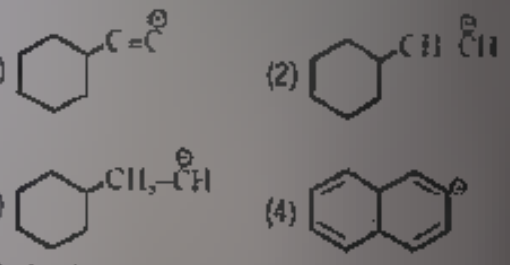
(I) CH_3-CH_2-COOH

(II) $OHC-CH_2-COOH$

(III) $Ph-CH_2-COOH$

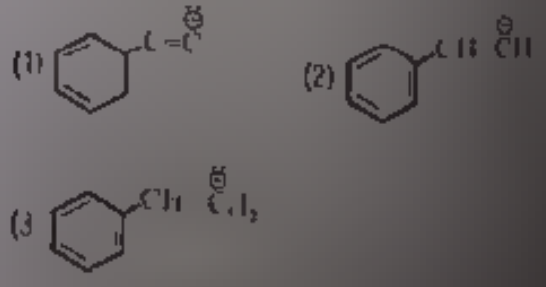
(1) III > I > (2) I > II >
(3) II > I > (4) > III > I

64 The stability of carbanion in the following



(1) 4 > 2 > 1 > 3
(2) 4 > 1 > 2 > 3
(3) 1 > 4 > 2 > 3
(4) 1 > 2 > 3 > 4

65. Basic strength order will be



(1 1 > 2 > 3 (2) 2 > 1 > 3
(3 3 > 1 > 2 (4) 3 > 2 > 1

66 Decreasing order of stability of the following carbocation ?

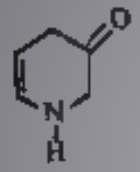
(A) m-(HO)-C_6H_4-$\overset{\oplus}{C}H_2$ (B) p-(HO)-C_6H_4-$\overset{\oplus}{C}H_2$

(C) p-C_6H_4(CHO)-$\overset{\oplus}{C}H_2$ (D) C_6H_5-$\overset{\oplus}{C}H_2$

(1) B > A > D > C (2) B > D > A > C
(3) B > D > C > A (4) D > C > B > A

67 Which of the following compound will be Aromatic?

(1)  (2) 

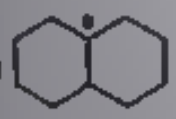
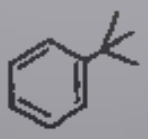
(3)  (4) 

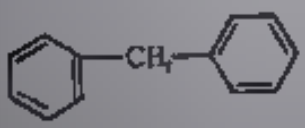
68. Compare the Heat of Hydrogenation and arrange in Decreasing order

(1) (2) (3)

(1) 1 > 2 > 3 (2) 2 > 1 > 3
(3) 3 > 2 > 1 (4) 1 > 3 > 2

69. Which of the following compound will show Hyperconjugation?

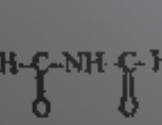
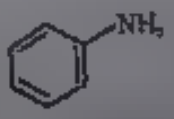
(1)  (2) 

(3) 

(1) 2 only (2) 1 and 3 only
(3) 1 and 2 (4) All of these

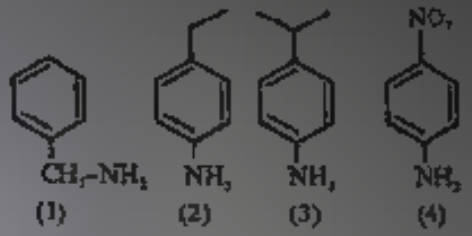
70 Correct order of pK_b is

(I) CH_3-CH_2-NH_2 (II) Ph-CH_2-NH_2

(III)  (IV) 

(1) I > II > III > IV (2) > IV > I >
(3) III > IV > II > I (4) II > I > III > IV

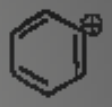
71 Correct Decreasing order of pK_b is

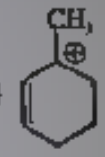
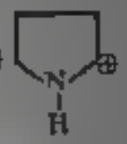


(1) (2) (3) (4)

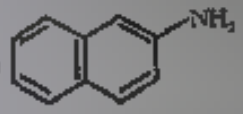
(1) 1 > 2 > 3 > 4 (2) 4 > 3 > 2 > 1
(3) 2 > 1 > 3 > 4 (4) 1 > 2 > 4 > 3

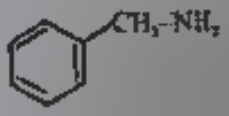
72 Which of the following carbocation is more stable

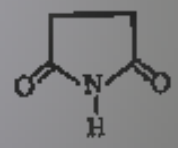
(1)  (2) 

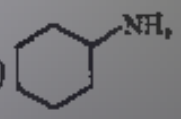
(3)  (4) 

73 Which of the following will be least Basic?

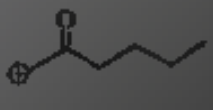
(1) 

(2) 

(3) 

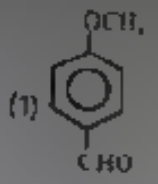
(4) 

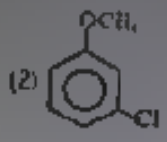
74. Which one of the following Carbocation is most stable:

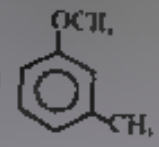
(1)  (2) 

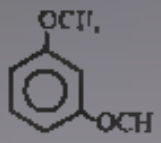
(3)  (4) $\overset{\oplus}{C}H_2$ - NO_2

75 The correct increasing order of Reactivity for following molecule towards E.S.R

(1) 

(2) 

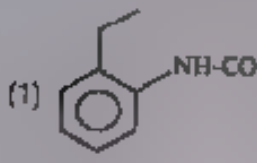
(3) 

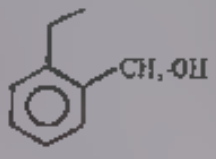
(4) 

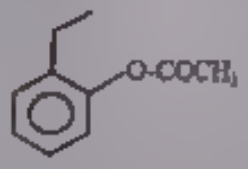
(1) 3 > 4 > 2 > 1 (2) 4 > 3 > 2 > 1
(3) 1 > 2 > 3 > 4 (4) 1 > 3 > 2 > 4

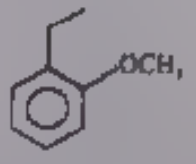
76. Nitro Benzene can be prepared from Benzene by using mixture of conc. HNO_3 and conc. H_2SO_4 in the mixture, H_2SO_4 act as a
(1) Catalyst (2) Reducing Reagent
(3) Acid (4) Base

77 Which one is most Reactive towards electrophilic Reagent

(1) 

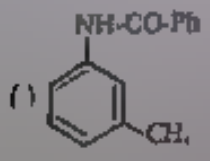
(2) 

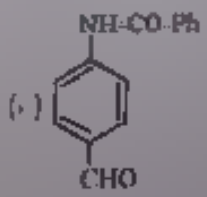
(3) 

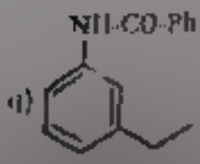
(4) 

78. Which of the following compound will not give Friedal craft Reaction?
(1) Mesitylene (2) Toluene
(3) Benzaldehyde (4) Xylene

79. Correct Reactivity order of E.S.R.

(I) 

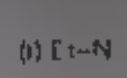
(II) 

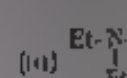
(III) 

(1) I > II > III (2) I > II > III
(3) I > III > II (4) II > I > III

80 Most reactive towards E.S.R
(1) Benzene (2) Chloro Benzene
(3) Phenyl Acetate (4) Nitro Benzene

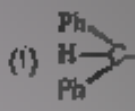
81 Correct Decreasing order of pK_b value of following Compounds is.

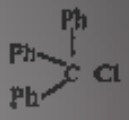
(i) Et–N: (ii) 

(iii)  (iv) 

(1) i > ii > iii > iv (2) iv > i > iii > ii
(3) iv > iii > i > ii (4) i > iii > ii > iv

82 In which of the following C–Cl Bond dissociation shall give most stable cation?

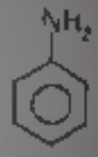
(1) 

(2) 

(3) 

(4) $Ph-CH_2-Cl$

83. Which of following is most basic

(1) CH_3-NH_2 (2) 

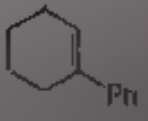
(3) 

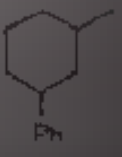
(4) 

84 Which one of the following is most stable

(1) 

(2) 

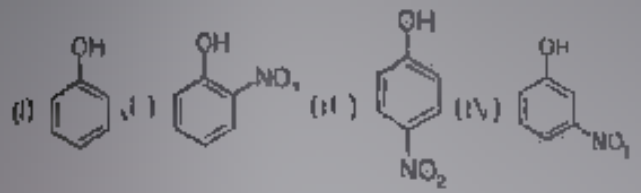
(3) 

(4) 

85 Which of the following is insoluble in $NaHCO_3$?
(1) Benzoic acid (2) Benzene sulphonic acid
(3) o-Nitrophenol (4) Picric acid

86. Which is the correct decreasing order of basic strength in aqueous medium
(1) $(CH_3)_3N > (CH_3)_2NH > CH_3NH_2 > NH_3$
(2) $(CH_3)_2NH > CH_3NH_2 > (CH_3)_3N > NH_3$
(3) $(CH_3)_2NH > (CH_3)_3N > CH_3NH_2 > NH_3$
(4) $CH_3NH_2 > (CH_3)_2NH > (CH_3)_3N > NH_3$

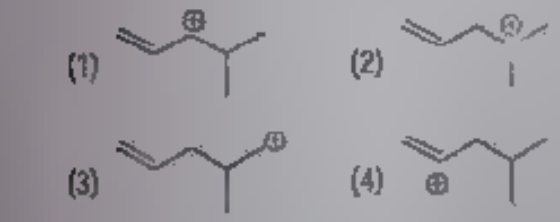
87 Which of the following is correct order of acidic strength



(1) I > II > III > IV (2) III > II > IV > I
(3) II > III > IV > I (4) IV > II > III > I

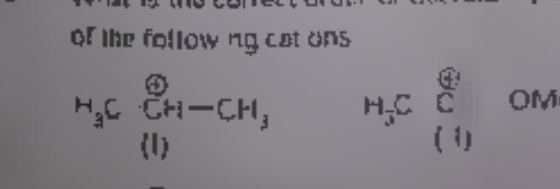
88. Correct order of basic strength in gas phase is
(I) CH_3-NH_2 (II) $(CH_3)_2NH$
(III) $(CH_3)_3N$ (IV) NH_3
(1) I > II > III > IV (2) I > I > I > IV
(3) III > II > I > IV (4) I > III > I > V

89. Which carbocation is most stable



90. Which of the following group has maximum hyper conjugation effect but minimum inductive effect
(1) $-CH_3$ (2) $-CH_2-CH_3$
(3) $-CD_3$ (4) $-CH(CH_3)_2$

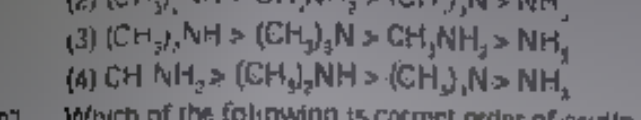
91 What is the correct order of decreasing stability of the following carbocations



(1) III > I > II (2) II > III > I
(3) II > I > III (4) I > II > III

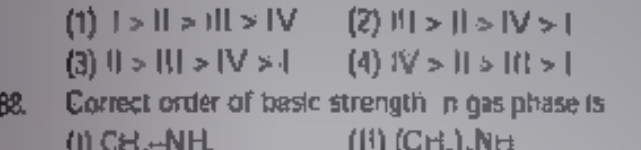
92 Phenol and carboxylic acid can be distinguished by
(1) Na (2) $NaHCO_3$
(3) Litmus test (4) All of these

93 Arrange the following in order of their leaving group tendency?



(1) I > II > III > IV (2) III > II > I > IV
(3) II > I > IV > III (4) III > V > II > I

94 Arrange the following in order of their decreasing acidic strength?



(1) I > II > III > V (2) IV > II > I > III
(3) IV > III > II > I (4) V > I > II > III

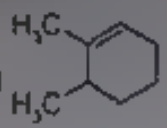
95 Arrange the following towards their reactivity for ESR

(1) I > V > II > III (2) I > III > IV > II
(3) I > II > III > IV (4) III > I > II > IV

96. Arrange the following in order of the decreasing basic strength

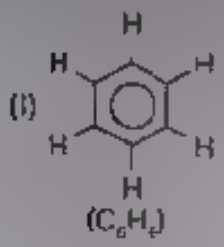
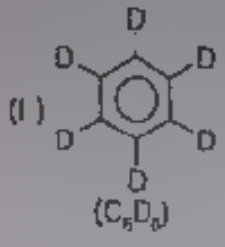
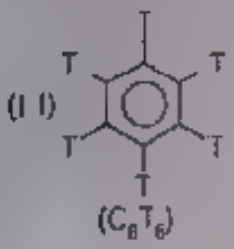
(1) IV > III > II > I (2) IV > I > III > II
(3) IV > III > I > II (4) III > I > II > IV

97 Arrange the following in decreasing order of their C–C bond length

(I) 
(II) 
(III) 
(IV) 

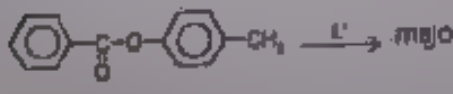
(1) I > IV > I > III (2) I > III > IV > I
(3) II > I > IV > II (4) None

98 Arrange the following in order of their reactivity towards nitration

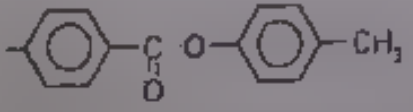
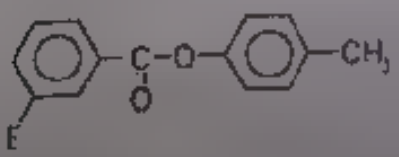
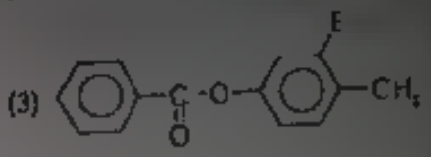
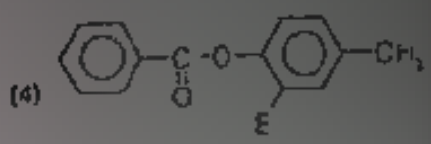
(I) 
(II) 
(III) 

(1) I = II = III (2) I = II = III
(3) I > II > III (4) III > II > I

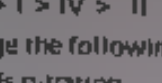
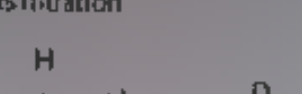
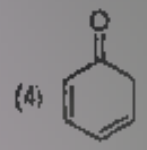
99 $CHCl_3$ is more acidic than CHF_3 because
(1) Cl has more –I than that of F
(2) $CHCl_3$ has more pKa than CHF_3
(3) Cl has vacant d-orbital therefore conjugate base of $CHCl_3$ is resonance stabilised
(4) both (1) & (2)

100.  major product

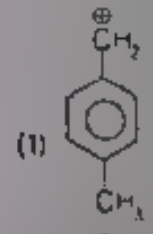
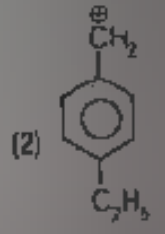
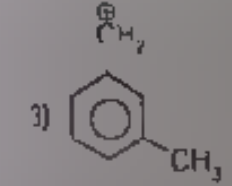
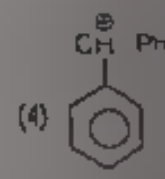
major product will be

(1) 
(2) 
(3) 
(4) 

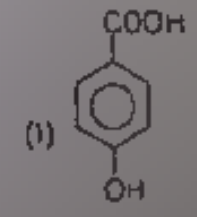
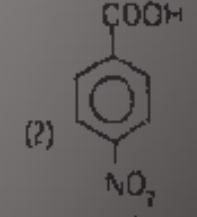
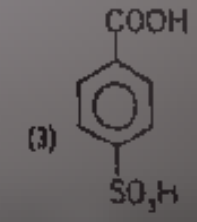
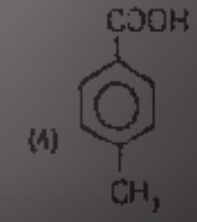
101 Which of the following leads to maximum enolisation

(1) 
(2) 
(3)
(4) 

102 Which of the following carbocation is maximum stable

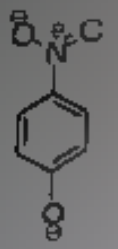
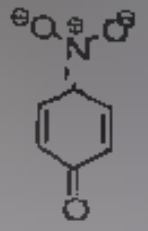
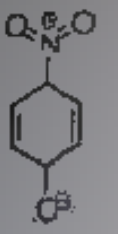
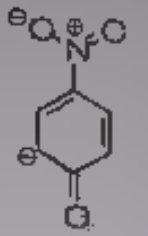
(1) 
(2) 
(3) 
(4) 

103 Which of the following is strongest acid among following

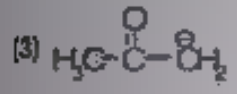
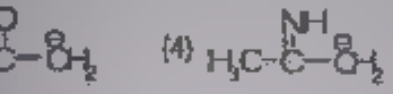
(1) 
(2) 
(3) 
(4) 

104 Which of the following is not an electrophile
(1) H_3O^+ (2) BH_3 (3) CH_3^- (4) $ZnCl_2$

105. The most likely representation of resonance structure of p-nitrophenoxide is

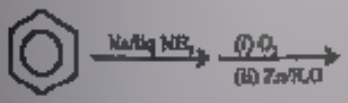
(1) 
(2) 
(3) 
(4) 

106. Which of the following carbanion is most stable?

(1) 
(2) 
(3) 
(4) 

HYDROCARBON

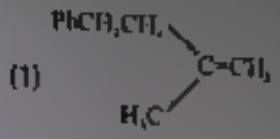
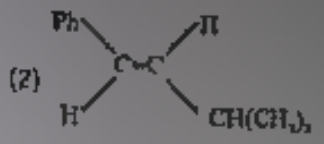
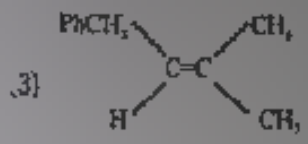
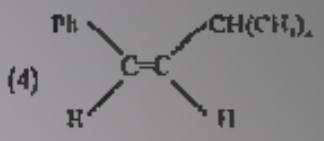
107 Phenyl magnesium bromide reacts with methanol to give :-
(1) A mixture of anisole and Mg(OH)Br
(2) A mixture of benzene and Mg(OMe)Br
(3) A mixture of toluene and Mg(OH)Br
(4) A mixture of phenol and Mg(Me)Br

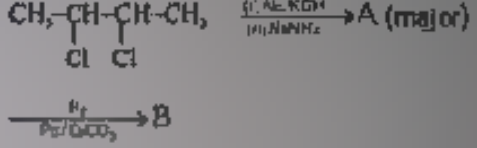
108 

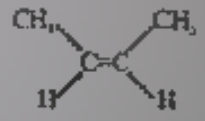
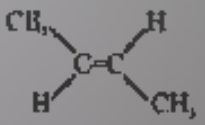
Identify the end product in the given reaction sequence
(1) Glyoxal
(2) Propanedial
(3) Glyoxal + Butanedial
(4) Glyoxal + Propanedial

109 The compound formed as a result of oxidation of ethyl benzene by $KMnO_4$ is
(1) Benzophenone (2) Acetophenone
(3) Benzoic acid (4) Benzyl alcohol

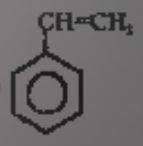
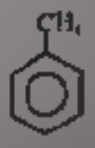
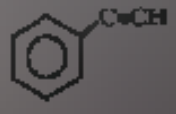
110 The main product of the following reaction is.
$PhCH_2CH(OH)CH(CH_3)_2 \xrightarrow{Conc.H_2SO_4}$

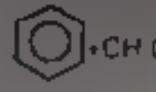
(1) 
(2) 
(3) 
(4) 

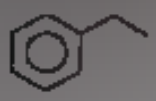
111 

(1) $CH_3CH_2-CH=CH_2$
(2) $CH_3-CH_2-CH_2-CH_3$
(3) 
(4) 

112 Which of the following does not decolourise reddish brown solution of Br_2/CCl_4

(1) 
(2) 
(3) 
(4) 

113 



Reagent x can be
(1) H_2/Red P (2) Zn-Hg/HCl
(3) $NH_2 - NH_2/\bar{O}H$ (4) All of these

114 Which one of the following compounds will give white precipitate with tollen's reagent?
(1) $CH_3-\underset{CH_3}{\overset{}{CH}}-CH_3$ (2) $CH_3-CH=CH_2$
(3) $CH_3-C\equiv CH$ (4) $CH_3-C\equiv C-CH_3$

115. Acetylene on heating in the presence of red hot Fe tube gives:
(1) Benzene (2) Cyclooctatetraene
(3) naphthalene (4) Anthracene

116. In the reaction sequence

$HC\equiv CH + HC\equiv CH \xrightarrow{CuCl/NH_4Cl} (A) \xrightarrow{HCl} (B)$

(B) will be:-
(1) $CH_3-\underset{CH_3}{\overset{}{CH}}-C\equiv CH$
(2) $CH_2=CH-\underset{Cl}{\overset{}{C}}=CH_2$
(3) $CH_2=CH-CH=CH-Cl$
(4) $CH_3-CH_2-C\equiv C-Cl$

117 Which among the following alkenes will be most stable
(1) Ethene
(2) 2-Methyl propene
(3) 2,3-Dimethyl-2-butene
(4) 2-butene

118 Which among the following compounds will give wurtz reaction?
(1) $CH_2=CH-Br$ (2) C_6H_5-Br
(3) $CH_2=CH-CH_2-Br$ (4) $HC\equiv C-Br$

119 In the following reaction

$C_2H_2 \xrightarrow[HgSO_4/H_2SO_4]{H_2O} (x) \longrightarrow CH_3-CHO$

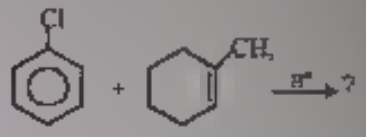
what is (x)
(1) CH_3-CH_2-OH (2) CH_3-O-CH_3
(3) CH_3-CH_2-CHO (4) $CH_2=CH-OH$

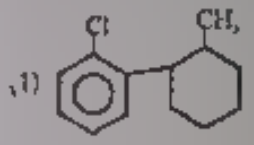
120. Anti-Markovnikov's addition of HBr is not observed in
(1) propene (2) 1-butene
(3) 2-pentene (4) 2-butene

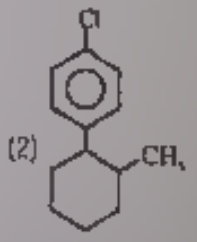
121 Propyne and propene can be distinguished by
(1) Conc. H_2SO_4 (2) Br_2 in CCl_4
(3) Dil. $KMnO_4$ (4) Ammonical $AgNO_3$

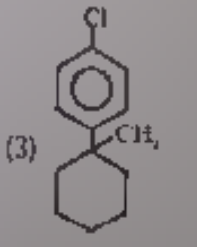
122 Which of these will not react with acetylene
(1) NaOH (2) Ammoniacal $AgNO_3$
(3) Na (4) HCl

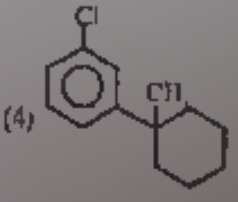
123 What is the product formed when acetylene reacts with hypochlorous acid
(1) CH_3COCl (2) $ClCH_2CHO$
(3) Cl_3CHCHO (4) $ClCH_2COOH$

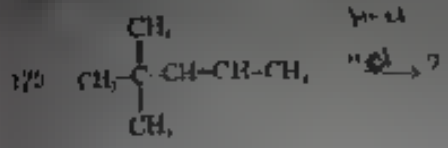
124 

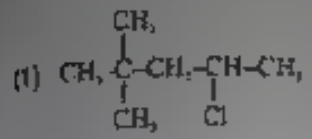
(1) 

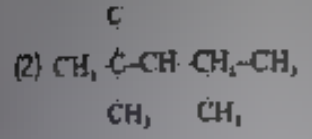
(2) 

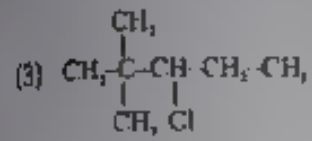
(3) 

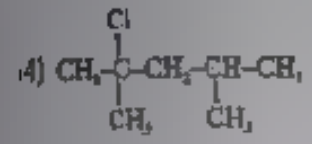
(4) 

125 

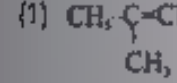
(1) 

(2) 

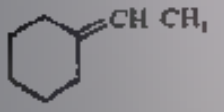
(3) 

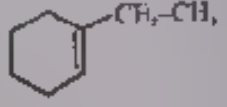
(4) 

126 Which is minimum reactive towards hydrogenation

(1) 

(2) Cl-CH=CH$_2$

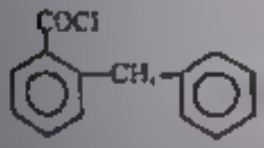
(3) 

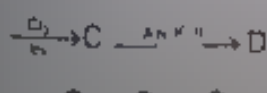
(4) 

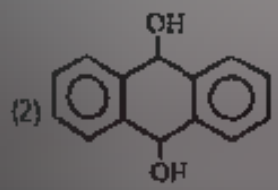
127 Debromination of d 2 3-d bromobutane gives

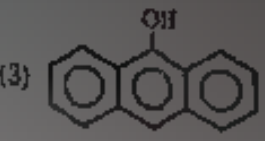
(1) Trans-2 butene (2) Cis-2-butene

(3) 1-butene (4) 2-butyne

128 

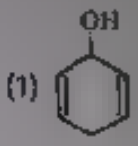


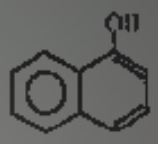
(2) 

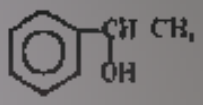


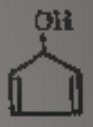
(4) 

129. Which is maximum reactive towards acid catalysed dehydration

(1) 

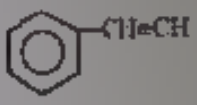
(2) 

(3) 

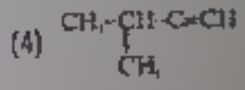
(4) 

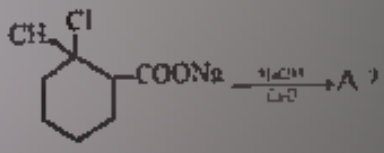
130. Which gives ketonic group after hydroboration oxidation

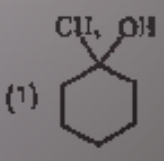
(1) CH_3-CH_2-C≡CH

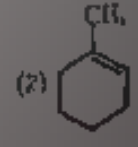
(2) 

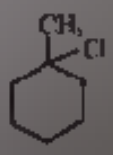
(3) CCl_3-C≡CH

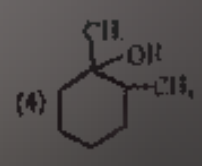
(4) 

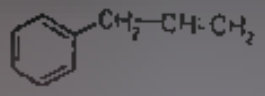
131 

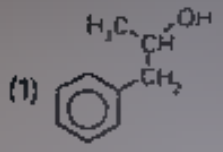
(1) 

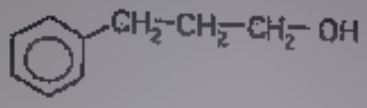
(2) 

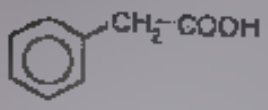
(3) 

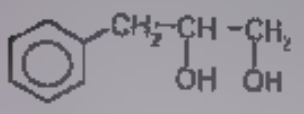
(4) 

132.  on oxymercuration demercuration produces the major product

(1) 

(2) 

(3) 

(4) 

133. How many chiral compounds are possible on mono-chlorination of 2-Methyl butane?
(1) 6 (2) 8 (3) 2 (4) 4

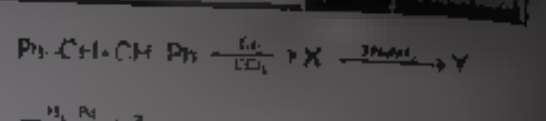
134. Ozonolysis of an organic compound 'A' produces acetone and propionaldehyde in equimolar mixture. Identify A from the following compounds
(1) 2-methyl-1-pentene
(2) 1-pentene
(3) 2-pentene
(4) 2-Methyl-2-pentene

135. Arrange the following in decreasing order of reactivity towards electrophilic substitution reaction

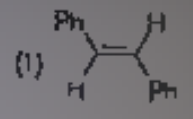
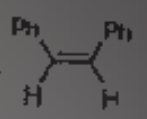
Aniline (I) Acetanilide (II)
Phenol (III) Anilinium chloride (IV)

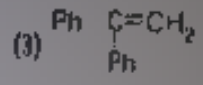
(1) II > I > III > IV
(2) I > III > II > IV
(3) II > III > I > IV
(4) IV > II > I > III

136. Which of the following is most basic
(1) Diphenylamine
(2) Triphenylamine
(3) p-Nitroaniline
(4) Benzylamine

137. 

Product Z is

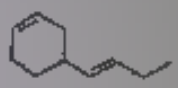
(1)  (2) 

(3)  (4) Ph–C≡C–Ph

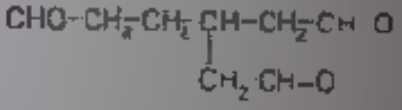
138. Which intermediate is formed during addition of halogen on alkenes?
(1) Carbocation (2) Carbanion
(3) cyclichalonium ion (4) halide ion

139. $CH_3-C\equiv CH \xrightarrow[dil.\ H_2SO_4]{HgSO_4}$ product

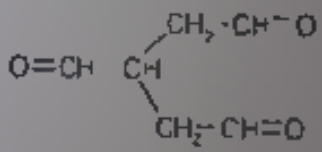
Product of the above reaction is
(1) an aldehyde (2) a ketone
(3) an alcohol (4) a carboxylic acid

140.  $\xrightarrow[THF/H_2O/Zn]{OsO_4}$ Product, Product is

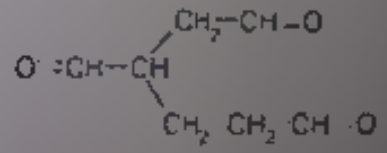
(1) $CH_3-CH_2-CH=O$ and



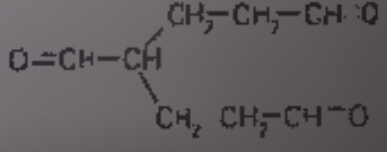
(2) $CH_3-CH_2-CH=O$ and



(3) $CH_3-CH_2-CH=O$ and

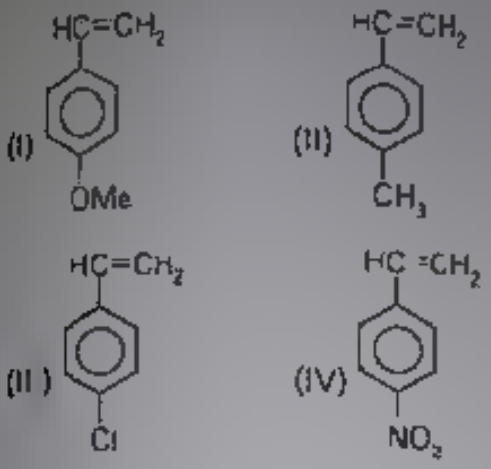


(4) $CH_3-CH_2-CH=O$ and



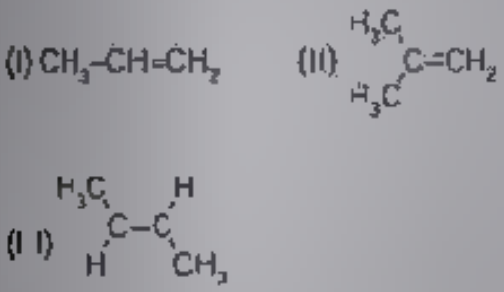
141 No of structural isomeric alkenes (molecular formula=C_6H_{12}) which all give n-hexane on hydrogenation in presence of metal catalyst
(1) 2 (2) 3 (3) 4 (4) 5

142 Arrange the following towards their reactivity for electrophilic addition reaction (EAR)

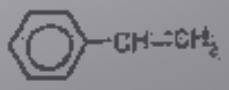


(1) > III > I > V (2) II > I > III > IV
(3) I > II > II > IV (4) II > III > I > IV

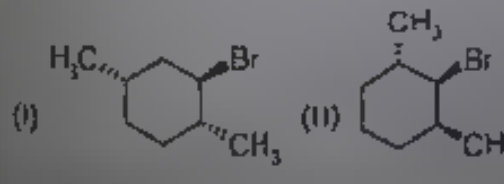
143. Arrange the following towards reactivity for heat of hydrogenation

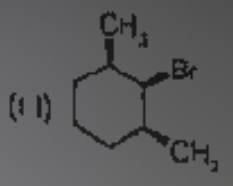


(1) II > I > III (2) I > II > II
(3) II > III > I (4) I > III > II

144. Arrange the following towards their reactivity for hydration?
(I) $CH_3O-CH=CH_2$ (II) $F-CH=CH_2$
(III) $CH_3-CH=CH_2$ (IV) 
(1) I > I > II > IV (2) I > III > V > II
(3) I > II > II > IV (4) I > IV > I > II

145 Arrange the following towards the rreactivity for E^2 elimination?





(I I)

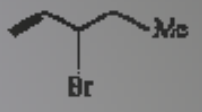
(1) II > I > II (2) I > II > I.I
(3) II > I > III (4) III > II > I

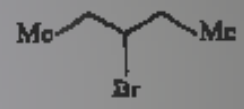
146. Benzene + Acetylchloride $\xrightarrow{AlCl_3}$ product
Name of above reaction is
(1) Wurtz fittig reaction
(2) Gattermann reaction
(3) Friedel Craft reaction
(4) Sholten baumann reaction

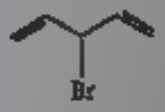
ALKYL HALIDE

147 Among the following alkyl bromide correct order of S_N1 reactivity is

(1) 

(2) 

(3) 

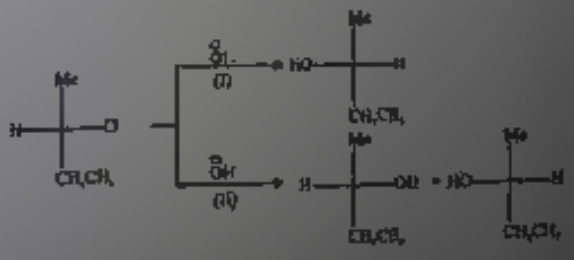
(4) 

(1) 1 > 2 > 3 > 4 (2) 4 > 2 > 3 > 1
(3) 4 > 3 > 2 > 1 (4) 2 > 4 > 3 > 1

148. The product of the reaction is

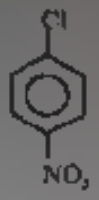
$CH_3-CH_2-\overset{O}{\overset{\|}{C}}-OAg \xrightarrow[\Delta]{Br_2}$ Major product

(1) $CH_2=CH_2$ (2) CH_3-CH_2-Br
(3) $CH_3CH_2CH_2-Br$ (4) $CH_3-CH=CH-CH_3$

149 

Reaction I and II are:
(1) Both S_N1 (2) Both S_N2
(3) I S_N1 II S_N2 (4) I S_N2 II S_N1

150 Which of the following compound undergo hydrolysis most easily

(1) 

(2) 

(3) 

(4) 

151. Consider the reaction

$CH_3-CH_2-CH_2-Br+NaCN \rightarrow CH_3CH_2CH_2-C\equiv N + NaBr$

The correct statement is :-

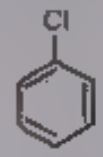
(1) The reaction will be fastest in water

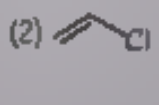
(2) The reaction will be fastest in N, N–dimethylformamide (DMF)

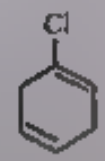
(3) Transition state of S_N2 is tetrahedral and sp^3 hybridized

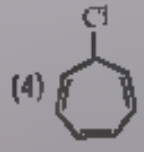
(4) If conc. of alkyl bromide is tripled and conc. of $\overset{\ominus}{C}N$ is reduced to half rate of S_N2 increased by 2 times

152 Which of the following compound will give curdy precipitate with $AgNO_3$ solution

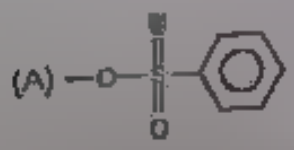
(1) 

(2) 

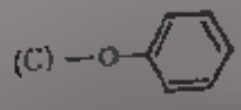
(3) 

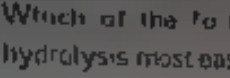
(4) 

153. Arrange the following group in order of their decreasing leaving ability

(A) 

(B) 

(C) 

(D) 

(1) A > D > B > C (2) A > D > C > B

(3) A > B > C > D (4) D > C > B > A

154 $(CH_3)_2CH-Cl + Na \xrightarrow{\text{Acetone}} (CH_3)_2CH-I$

The above reaction is known as

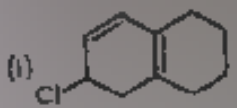
(1) Swarts reaction

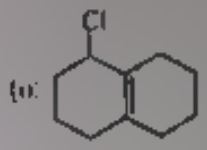
(2) Finkelsteins

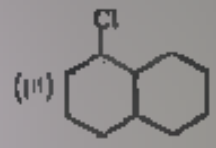
(3) Fittig Rxn

(4) Sabatier senderence Rxn

155 The correct order for E_1 reaction with alc. KOH will be

(I) 

(II) 

(III) 

(1) I > II > III (2) III > II > I

(3) II > I > III (4) III > I > II

156. Which of the following reaction is correct

(1) $CH_3CH_2-Br+KCN \longrightarrow CH_3CH_2-NC$ (2)
$CH_3CH_2-Br+AgCN \rightarrow CH_3CH_2-CN$

(3) $CH_3CH_2-Br + KNO_2 \rightarrow CH_3-CH_2-N(=O)-O$

(4) $CH_3-CH_2-Br+AgNO_2 \longrightarrow CH_3-CH_2-N(=O)-O$

157. Which of the following compound is most reactive toward S_N2 displacement?

(1) $CH_3CH_2CH_2CH_2-Cl$

(2) $(CH_3)_3C-Cl$

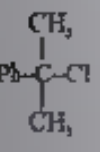
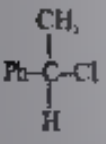
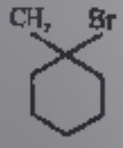
(3) $CH_3-\underset{CH_3}{\underset{|}{CH}}-\underset{Cl}{\underset{|}{CH}}-CH_3$

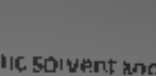
(4) $CH_3-\underset{CH_3}{\underset{|}{CH}}-CH_2-Cl$

158. Which of the following statement is incorrect -
(1) Boiling point of alkyl halide is R–I > R–Br > R–Cl > R–F
(2) Alkyl halide are soluble in organic solvent and insoluble in water generally
(3) Freons are used for aerosol propellant, refrigeration and air conditioning purpose.
(4) o and –m dichlorobenzene has higher melting point than those of p–isomer

159. Which of the following is correctly match:-
(A) Chloramphinicol →(1) Iodine containing Hormone
(B) Thyroxine→ (2) Chlorine containing antibiotic
(C) Chloroquine→ (3) Treatment for malaria
(D) Fluorinated compound (4) Potential blood substituted
(E) Iodoform → (5) Antiseptic
(1) A, B, C (2) B C
(3) C, D, E (4) D, E

160. $C_2F_3Cl_3$ is named as -
(1) Freon –112 (2) Freon–112
(3) Freon–113 (4) Freon–114

161. Which one of the following will give racemised product in C_2H_5OH?
(1) $CH_3-\underset{CH_3}{\overset{}{CH}}-Br$
(2) 
(3) 
(4) 

162. Arrange the following group in order of their nucleophilic strength.
(A) $CH_3\ \ddot{O}^{\ominus}$
(B) $CH_3CH_2-\ddot{O}$
(C) $CH_3\ \ddot{O}\ CH_3\ \ddot{O}^{\ominus}$
(D) 
(1) A > B > C > D (2) D > B > C > A
(3) B > A > D > C (4) A > B > D > C

163. Which of the following molecule would have a carbon halogen bond most susceptible to nucleophilic substitution?
(1) 2-Fluorobutane (2) 2-Chlorobutane
(3) 2-Bromo butane (4) 2-Iodobutane

164. Which of the following is most reactive toward nucleophilic substitution reaction?
(1) $CH_2=CH-Cl$
(2) C_6H_5-Cl
(3) $CH_3-CH=CH-Cl$
(4) $Cl-CH_2-CH=CH_2$

165. An S_N2 reaction at an asymmetric carbon of a compound always give.
(1) an enantiomer of the substrate
(2) a product with opposite rotation
(3) a mixture of diastereomer
(4) a single stereoisomers

166. The synthesis of alkyl fluoride is best accomplished by
(1) Free radical fluorination
(2) Sandmeyor reaction
(3) Finkelstein reaction
(4) Swarts reaction

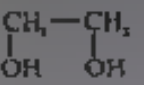
167. The reagent that brings about the conversion of(R)–butan-2-ol to (R)-2-chlorobutane is -
(1) $SOCl_2$ (2) PCl_5
(3) PCl_3 (4) all of them

168. Which of the following is correct order of dipole moment.-
(1) $CH_3-F > CH_3-Cl > CH_3-Br > CH_3-I$
(2) $CH_3-Cl > CH_3-F > CH_3-Br > CH_3-I$
(3) $CH_3-Cl > CH_2Cl_2 > CCl_4 > CHCl_3$
(4) $CH_2Cl_2 > CH_3Cl > CHCl_3 > CCl_4$

169. DDT is manufactured by the acid catalysed condensation of -
(1) Chloroform and acetone
(2) Chloroform and nitric acid
(3) Chlorobenzene and chloral
(4) Chlorobenzene and chloroform

170 Which of the following compound is used as refrigerant?

(1) CF_4 (2) CCl_4

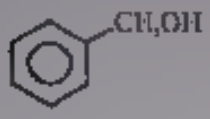
(3) CCl_2F_2 (4) 

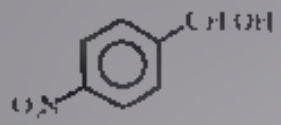
171 Which of the following is added to chloroform in a small quantity before it is bottled for sale?

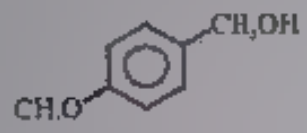
(1) CH_3OH (2) C_2H_5Cl

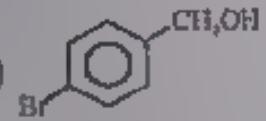
(3) C_2H_5OH (4) $AgNO_3$

172. Arrange the following compound for their reactivity toward nucleophilic substitution with HBr?

A) 

B) 

(C) 

(D) 

(1) A > B > C > D (2) C > A > D > B

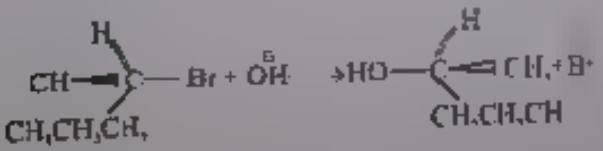
(3) D > C > B > A (4) B > D > A > C

173. Which of the following is secondary alkyl halide?

(1) Isobutyl chloride (2) Isopentyl chloride

(3) Isopropyl chloride (4) Neopentyl chloride

174 The reaction take place by mechanism is



(1) S_Ni (2) S_Ni' (3) S_Ni'' (4) S_Ni'''

175. Which of the following reaction occur most rapidly?

(1) $(CH_3)_3CH_2OH \xrightarrow{HBr}$

(2) $(CH_3)_2CHOH \xrightarrow{HI}$

(3) $(CH_3)_3CH_2OH \xrightarrow{HBr}$

(4) $(CH_3)_3CH_2OH \xrightarrow{HI}$

176 In S_N2 reactions, the correct order of reactivity for following compounds

CH_3Cl, CH_3CH_2Cl, $(CH_3)_2CHCl$, $(CH_3)_3CCl$ is

(1) $CH_3Cl > CH_3CH_2Cl > (CH_3)_2CHCl > (CH_3)_3CCl$

(2) $(CH_3)_3CCl > (CH_3)_2CHCl > CH_3CH_2Cl > CH_3Cl$

(3) $CH_3Cl > (CH_3)_2CHCl > CH_3CH_2Cl > (CH_3)_3CCl$

(4) $CH_3Cl > CH_3CH_2Cl > (CH_3)_2CHCl > (CH_3)_3CCl$

177 Which of the following compounds will give a yellow ppt with iodine and alkali

(1) Acetamide (2) 3-Hydroxypentane

(3) Acetophenone (4) Methyl acetate

178 Which of the following undergoes fastest reaction with aqueous NaOH solution

(1) $C_6H_5CH(OMe)CH_3$

(2) $C_6H_5CH(Cl)CH_3$

(3) $C_6H_5CH(Cl)CH_2CH_3$

(4) $C_6H_5CH(C_6H_5)CH_3$

179 Which of the following intermediate is formed in Reimer-Tiemann reaction?

(1) Carbocation (2) Carbanion

(3) Carbene (4) Free radical

180. Which of the following statement is not correct for nucleophilic substitution reaction?

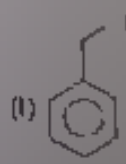
(1) Correct decreasing order for S_N1 reactivity is $(CH_3)_3C-Cl > (CH_3)_2CHCl > CH_3CH_2Cl$

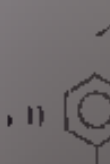
(2) Stereochemical inversion occurs in S_N2 reaction

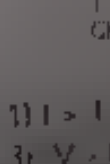
(3) Racemisation occurs in S_N1 reaction

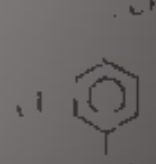
(4) Carbocation is formed during S_N2 reaction

181 Reactivity order for S_N1 reaction

(I) 

(II) 

(III) 

(IV) 

(1) I > II > III > IV (2) II > I > IV > III

(3) IV > I > II > III (4) I > II > III > IV

182. A set of two organic compound can be distinguished by iodoform test from each other set of compound may not be

(1) CH_3-CH_2-OH & CH_3OH

(2) CH_3COCH_3 & $PhCOCH_3$

(3) CH_3CHO & $HCHO$

(4) $H_3C-\underset{OH}{CH}-CH_3$ & $H_3C-\underset{OH}{\overset{CH_3}{\overset{|}{C}}}-CH_3$

183. Major product of the following reaction

$CH_3-CH_2Br \xrightarrow{KCN} \xrightarrow[H_2O]{OH^-} \xrightarrow[\Delta]{H^+}$ product

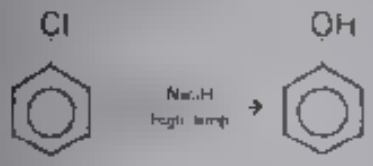
(1) CH_3-CH_2Cl

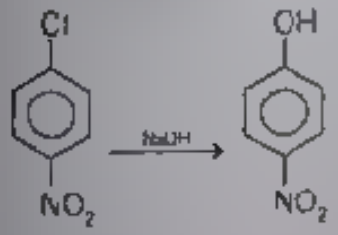
(2) $H_3C-CH_2-\underset{\underset{O}{\|}}{C}-Cl$

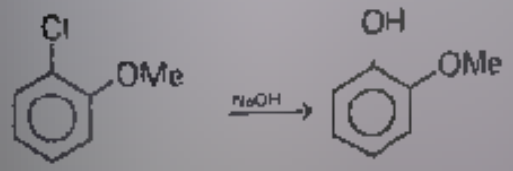
(3) CH_3-CH_2CN

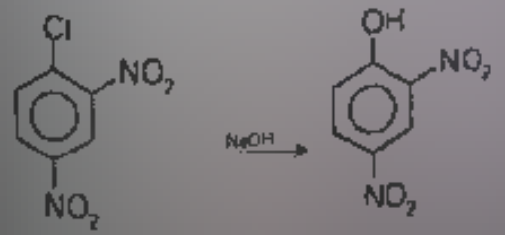
(4) $CH_3-\underset{\underset{O}{\|}}{C}-NH_2$

184. Which reaction is least feasible

1) 

2) 

3) 

4) 

OXYGEN CONTAINING COMPOUND I

185. An ether is more volatile than alcohol having the same molecular formula. This is due to

(1) Intermolecular H bonding in ethers

(2) Intermolecular H-bonding in alcohols

(3) Dipole character of ethers

(4) Alcohol have resonating structure

186. Among the following compounds which can be dehydrated very easily is

(1) $CH_3-CH_2-\underset{\underset{CH_3}{|}}{CH}-CH_2-OH$

(2) $CH_3-CH_2-CH_2-\underset{\underset{OH}{|}}{CH}-CH_3$

(3) $CH_3-CH_2-\underset{\underset{OH}{|}}{\overset{CH_3}{\overset{|}{C}}}-CH_2-CH_3$

(4) $CH_3-CH_2-CH_2-CH-CH_2-OH$

187. Among the following the one that gives positive iodoform test upon reaction with I_2 and NaOH is:-

(1) $CH_3-CH_2-\underset{\underset{OH}{|}}{CH}-CH_2-CH_3$

(2) $C_6H_5-CH-CH_2-OH$

(3) $CH_3-\underset{\underset{CH_3}{|}}{CH}-CH_2OH$

(4) $PhCHOHCH_3$

188. In the following sequence of reaction

$CH_3CH_2OH \xrightarrow{P+I_2} A \xrightarrow[\text{alcohol}]{Mg} B \xrightarrow{HCHO} C \xrightarrow{H_2O} D$

the compound D is -

(1) Butanal (2) n-butyl alcohol

(3) n-propyl alcohol (4) propanal

189. Glycerol on treatment with oxalic acid at 110°C form

(1) formic acid (2) CO_2 and CO

(3) Allyl alcohol (4) Glycol

190. n-propyl bromide reacts with aqueous KOH to form

(1) Propane (2) Propene

(3) Propyne (4) propanol

191 When phenol is treated with bromine water it gives

(1) o- and p-bromophenol

(2) 2, 3, 4 - tribromophenol

(3) 2, 4, 6 - tribromophenol

(4) None

192 When $CH_3-CH=CH-COOH$ is reduced with $LiAlH_4$, the compound obtained will be

(1) CH_3-CH_2-COOH

(2) $CH_2=CH-CH_2-OH$

(3) $CH_3-CH=CH-CH_2-OH$

(4) $CH_3-CH=CHO$

193. In the given reaction

$$C_6H_5-\underset{\underset{O}{\|}}{C}-OH + ROH \xrightarrow{H^+} C_6H_5-\underset{\underset{O}{\|}}{C}-O-R$$

Which alcohol will be most reactive

(1) CH_3-OH (2) CH_3-CH_2-OH

(3) $C_6H_5-CH(OH)-CH_3$ (4) $CH_3-\underset{\underset{CH_3}{|}}{\overset{\overset{OH}{|}}{C}}-CH_3$

194 In the given reaction

$$CH_3-\underset{\diagdown\ \diagup}{\overset{O}{CH}}-CH_2 \xrightarrow[\text{anhydrous}]{HBr} [X]$$

[X] will be

(1) $CH_3-\underset{\underset{CH_3}{|}}{CH}-CH_2-OH$

(2) $CH_3-CH_2-CH_2-CH_2$
OH

(3) $CH_3-\underset{\underset{CH_3}{|}}{\overset{\overset{OH}{|}}{C}}-CH_3$

(4) $CH_2=CH-CH_3$

195 The fermentation of starch to give alcohol occurs mainly with the help of

(1) O_2 (2) Air

(3) CO (4) Enzymes

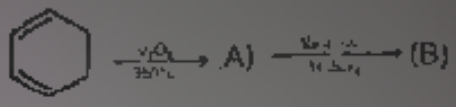
196 $A \xrightarrow{H_2O} B \xrightarrow{[Ag(NH_3)_2]^+} CH_3-\underset{\underset{OH}{|}}{\overset{\overset{CH_3}{|}}{C}}-COOH$

The reactant A is

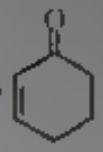
(1) $CH_3CHOHCH_3$ (2) CH_3COCH_3

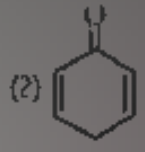
(3) C_2H_5OH (4) CH_3COOH

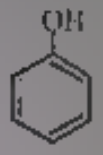
197 In the given reaction

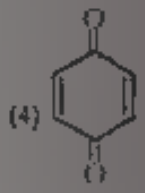


Product (B) is

(1) 

(2) 

3) 

(4) 

198. In the given reaction

$CH_3-CH=CH-CH_2-OH \xrightarrow{PCC}$ Product

Product is

(1) $CH_3-CH_2-CH=CH-OH$

(2) $CH_3-CH_2-CH_2-CHO$

(3) $CH_2=CH-CH=CH-CHO$

(4) $CH_3-CH=CH-COOH$

199 Reaction of phenol with dil HNO_3 gives

(1) p- and m- nitro phenol

(2) o- and p- nitro phenol

(3) picric acid

(4) o- and m- nitro phenol

200. In the given reaction

$CO + H_2 \xrightarrow{Zn-Cr_2O_3} \text{Product}$

(1) CH_3OH (2) $\underset{\underset{CH_2OH}{|}}{\overset{\overset{CH_2OH}{|}}{CH}}$

(3) $\underset{\underset{CHO}{|}}{\overset{\overset{CHO}{|}}{CH}}$ (4) $\underset{\underset{COOH}{|}}{\overset{\overset{COOH}{|}}{CH}}$

201 In the following series of chemical reaction identify Z

$$C_2H_5OH \xrightarrow{\text{conc. } H_2SO_4,\ 170^\circ C} X \xrightarrow{Br_2} Y \xrightarrow[\text{Anhyd. } AlCl_3]{\text{Excess of}} Z$$

(1) $CH_2(NH_2)-CH_2-CH_2(NH_2)$

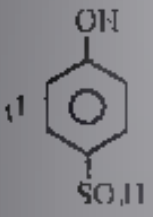
(2) $CH_2(OH)-CH(OH)-CH_2(OH)$

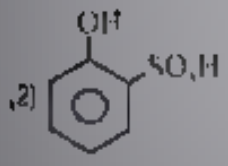
(3) $CH_3-C(OH)=CH_2$

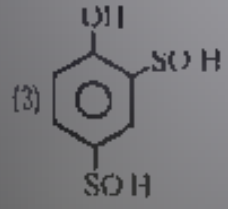
(4) $CH\equiv C-C\equiv CH$

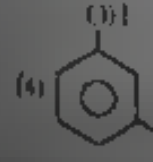
202 In following reaction sequence

Product is

(1) 

(2) 

(3) 

(4) 

203 Methanol and ethanol are distinguished by the

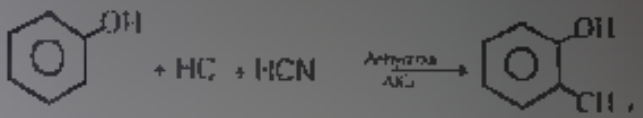
(1) Action of HCl

(2) Iodoform test

(3) Solubility of water

(4) Sodium

204 The following reaction



is known as

(1) Perkin reaction

(2) Gattermann aldehyde synthesis

(3) Kolbe reaction

(4) Gattermann-Koch reaction

205. Which of the following give ether ?

(1) CH_3CH_2ONa and C_2H_5I

(2) $CH_2-CH_2-OH \xrightarrow{\Delta,\ 140^\circ C}$

(3) $CH_3-CH_2-C(=O)-OH \xrightarrow{Ag_2O}$

(4) All of the above

206 In the given reaction

$$C_6H_5-O-CH_2-CH_3 \xrightarrow{Excess\ HI} [X] + [Y]$$

[X] and [Y] will respectively be

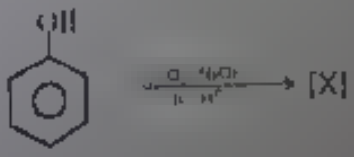
(1) C_6H_5I and CH_3CH_2I

(2) C_6H_5OH and $CH_3-CH=O$

(3) C_6H_5I and CH_3CH_2OH

(4) C_2H_5OH and $CH\equiv CH$

207 In the given reaction



[X] will be

(1) Salicylic acid

(2) p-hydroxybenzoic acid

(3) Mixture of 1 and 2

(4) Salicylaldehyde

208. Rectified spirit contains
(1) 94.6% C_2H_5OH
(2) 95.6% C_2H_5OH
(3) 96.6% C_2H_5OH
(4) 97.6% C_2H_5OH

209. Phenol reacts with PCl_5 to give mainly
(1) p-chlorophenol
(2) chlorobenzene
(3) o-and p-chlorophenol
(4) Triphenyl phosphate

210. In the given reaction

$CH_3-CH_2-CH_2-O-CH-CH_3 \xrightarrow{HCl} [X \text{ & } Y]$

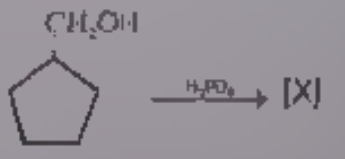
[X] and [Y] respectively be
(1) $CH_3CH_2CH_2OH$ and CH_3CH_2Cl
(2) $CH_3CH_2CH_2Cl$ and CH_3CH_2OH
(3) $CH_3CH_2CH_2Cl$ and $CH_2=CH_2$
(4) $CH_3-CH=CH_2$ and $CH_2=CH_2$

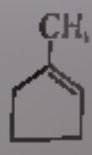
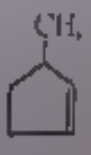
211. Phenolphthalein is obtained from condensation between
(1) Phenol and succinic acid
(2) Phenol and phthalic anhydride
(3) Phenol and succinic anhydride
(4) Phenol and benzaldehyde

212. Which of the following is most acidic
(1) Phenol (2) Benzyl alcohol
(3) m-chlorophenol (4) cyclohexanol

213. Ethylene glycol on oxidation with periodic acid gives
(1) Oxalic acid (2) Glyoxal
(3) Formaldehyde (4) Glycolic acid

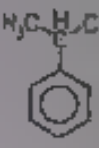
214. Identify the product [X]



(1) 
(2) 
(3) 
(4) 

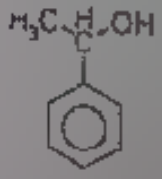
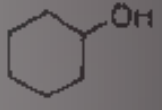
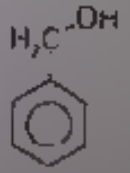
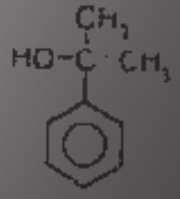
215. Amongst the following alcohols which would react fastest with conc. HCl and $ZnCl_2$?
(1) 2 Methylbutan 1-ol
(2) 2 Pentanol
(3) 1 Pentanol
(4) 2-Methyl-2-butanol

216. Alcohol is not formed as product in
(1) $CH_3-CH_2-NH_2 \xrightarrow{NaNO_2+HCl(aq)}$
(2) $CH_3-CHO \xrightarrow[+H_2O]{(CH_3)_2CHMgCl}$
(3) $H_3C-\overset{O}{\overset{\|}{C}}-NH_2 \xrightarrow{LiAlH_4}$
(4) $CH_3-CH_2-C \equiv N \xrightarrow{KOH(aq)}$

217 
$\xrightarrow[\text{oxidation}]{O_2} P \xrightarrow{dil.\ H_2SO_4} Q + \text{Acetone}$

Q does not react with
(1) Na (2) NaOH
(3) $NaHCO_3$ (4) Zn, Δ

218. Minimum reactive towards dehydration in acidic medium

(1) 
(2) 
(3) 
(4) 

OXYGEN CONTA NING-II

219 Benzaldehyde

Find "C"

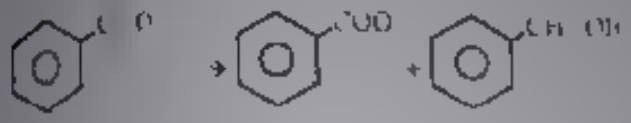
(1) H , Pd , $BaSO_4$

(2) CO / HC , A C

(3) CH_3NH_2 / HC $AlCl_3$

(4) CrO_3 Ac O

220 Which of the following correct set of name reaction

(a) 

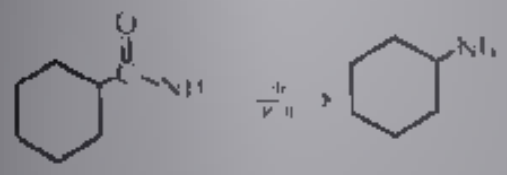
Cannizzaro reaction

(b) $CH_3-CH_2-CHO \xrightarrow{NaOH} CH_3-\underset{CHO}{\underset{|}{C}}=CH-CH_2-CH_3$

Aldol condensation

(c) $CH_3-CH_2-COOH \xrightarrow{Cl_2} CH_3-\underset{Cl}{\underset{|}{CH}}-COOH$

HVZ reaction

(d) 

Hoffmann's bromamide

1) a b (2) b, c

3) a, b c (4) A

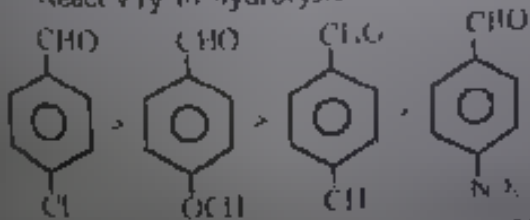
221 Which of the following is correct order :

(a) $CH_3-CHO > Ph-CHO > CH_3-\overset{O}{\overset{||}{C}}-CH_3 > Ph-\overset{O}{\overset{||}{C}}-Ph$

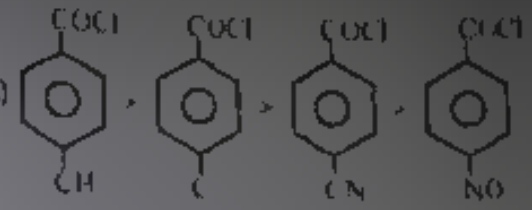
Reactivity in nucleophilic addition reaction

(b) 

Reactivity in hydrolysis

(c) 

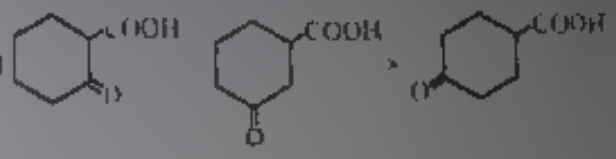
Reactivity in nucleophilic addition reaction

(s) 

Reactivity in hydrolysis

(t) HCHO > CH_3CHO > $(CH_3)_2CO$ > Ph-CHO

Reactivity towards Grignard reagent

(u) 

Rate of decarboxylation

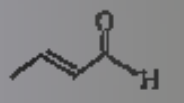
1) p, q (2) r s t

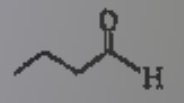
(3) p q, r s (4) p, q, u

222 But-2-ene $\xrightarrow[\text{Dry ether}]{O_3} P \xrightarrow{H_2O} Q \xrightarrow[Zn]{CH_3COOH} R$

R is

(1) 

(2) 

(3) 

(4) 

223 Glyoxal form by

(a) 

(b) CH_3-CHO $\xrightarrow{Se}$

(c) CH = CH $\xrightarrow{O_3}$ $\xrightarrow{H_2O_2}$

(d) CH = CH $\xrightarrow{KMnO_4}$

(1) a, b, c (2) a, c, d

(3) a d (4) A

224 (a) Purine aldehyde $\xrightarrow{\text{dil. NaOH}}$ Product → Cannizzaro reaction

(b) α-Methylcyclohexanone $\xrightarrow{\text{NaOH}}$ Product → Aldol condensation

(c) Toluene $\xrightarrow{CrO_2Cl_2, CS_2}$ Product → Etard reaction

(d) Benzene + CO + HCl $\xrightarrow{AlCl_3}$ Product → Gattermann's Koch reaction

(e) Benzene + HCN + HCl $\xrightarrow{AlCl_3}$ Product → Gattermann's aldehyde synthesis

Which of the following is correct set

(1) a, b, c, d (2) a, b, d, e

(3) a, b, c, e (4) a, b, c, d, e

225. Which of the following is not correct reaction

(P) Oxalic acid $\xrightarrow{\Delta}$ Formic acid

(Q) Malonic acid $\longrightarrow$ Acetic acid

(R) Succinic acid $\xrightarrow{\Delta}$ Succinic Anhydride

(S) Adipic acid $\xrightarrow{\Delta}$ Cyclopentanone

(T) Formic acid $\xrightarrow{\Delta}$ CO

(1) P, Q (2) R, S, T

(3) P, Q, T (4) Only T

226 Which of the following reaction not involved formation of nitrene

(1) Gabriel phthalamide reaction

(2) Schlmidt reaction

(3) Curtius reaction

(4) Hoffmann's reaction

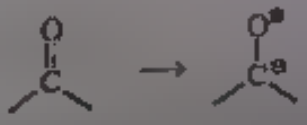
227. Which of the following statement is not true about carbonyl group .

(1) Carbon-oxygen bond is polarised due to higher electronegativity of oxygen

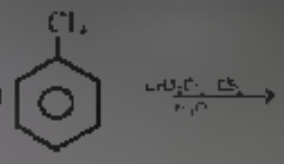
(2) Carbonyl carbon is electrophilic while oxygen is nucleophilic center

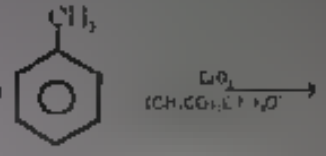
(3) Carbonyl group have more dipole moment then ether

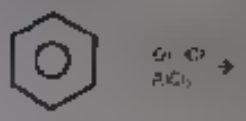
(4) Polarity of carbonyl group as given

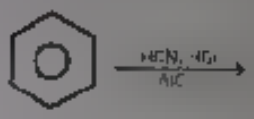


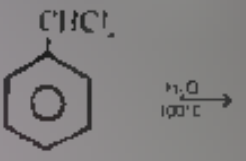
228 Which of the following reaction form benzene carbaldehyde as a product

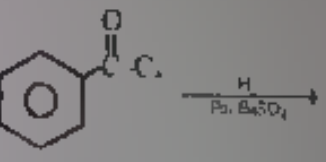
(a) 

(b) 

(c) 

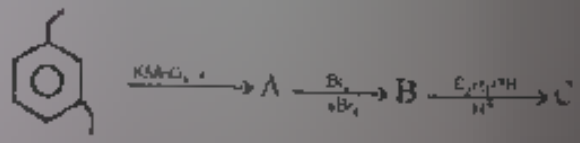
(d) 

(e) 

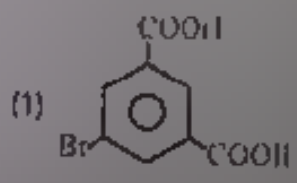
(f) 

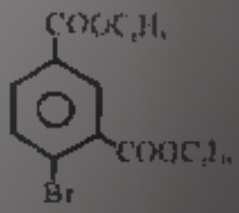
(1) a, b, c, d (2) a, b, d, e

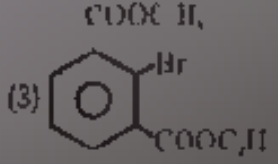
(3) a, b, e, f (4) a, b, c, d, e, f

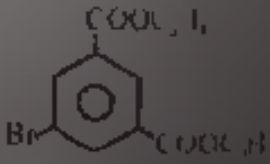
229 

C is

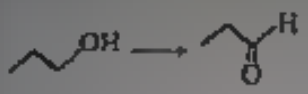
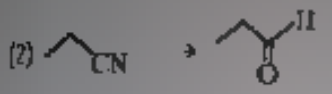
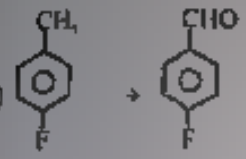
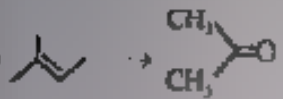
(1) 

(2) 

(3) 

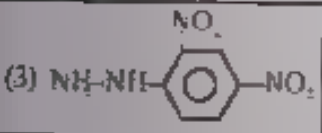
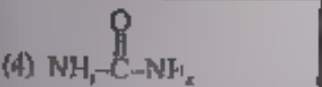
(4) 

230. Which of the following is not correct matched:

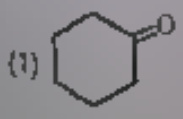
Reaction	*Reagent*
(1) 	PCC
(2) 	DiBAL-H
(3) 	CrO_2/Ac_2O /H_3O^+
(4)  $+ CH_3CHO$	$KMnO_4$/ H^+

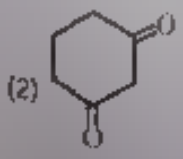
231. Which of the following product is not correct :

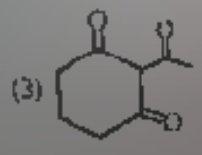
Carbonyl compound + Reagent ⟶ Product

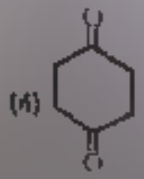
Reagent	Product
(1) NH_3	Imine
(2) NH_2OH	Oxime
(3) 	2,4-Dinitrophenyl hydrazone
(4) 	Semicarbazone

232. Which of the compound have most acidic αH

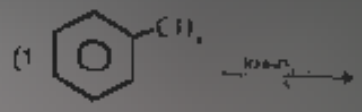
(1) 

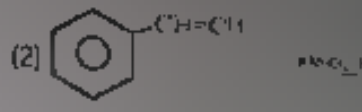
(2) 

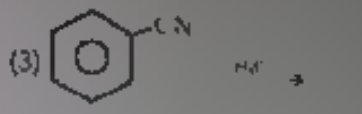
(3) 

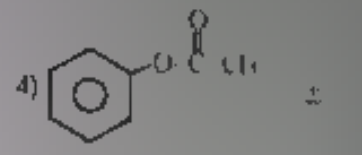
(4) 

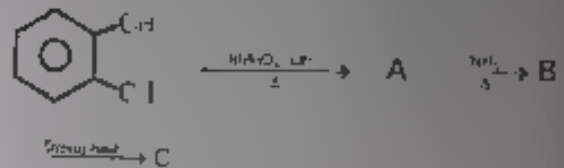
233 Benzoic acid not form in

(1) 

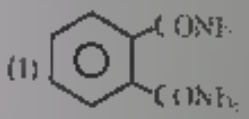
(2) 

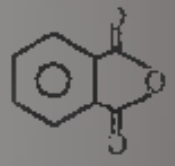
(3) 

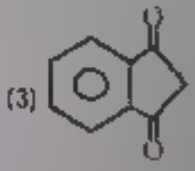
(4) 

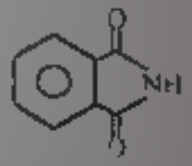
234 

C is

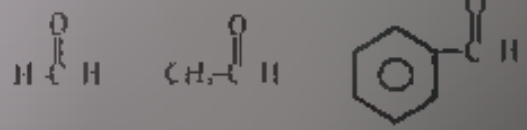
(1) 

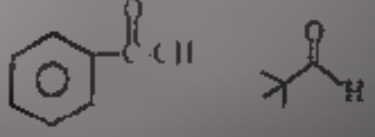
(2) 

(3) 

(4) 

235 How many compounds gives Cannizzaro reaction and aldol condensation respectively





(1) 3, 2
(2) 2, 3
(3) 1, 4
(4) 4, 1

236 

X is

(1) (a) BH_3, THF (b) H_2O / OH

(2) H_3O^+

(3) (a) O_3 (b) Zn/H_2O

(4) (a) BH_3/THF (b) H_2O_2/OH (c) CrO_3

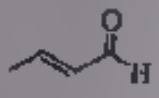
237 Which of the following set is correct

Compound	*Positive test of*
(a) CH_3CHO	Fehling test
(b) Ph–CHO	Tollen's reagent
(c) $HCOOH$	Benedict solution
(d) Ph–CHO	Fehling solution
(e) CH_3COCH_3	Tollen's reagent

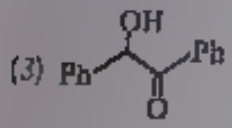
(1) a, b, c, d (2) a, b, c

(3) a, b, d, e (4) All

238 Which of the following compounds not shows positive tollen's test

(1) 

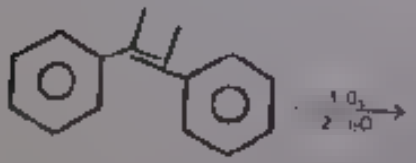
(2)

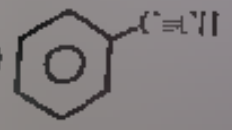
(3) 

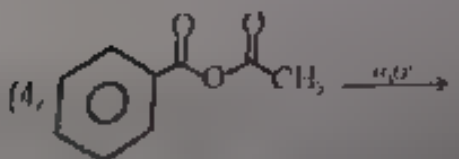
(4) 

239 Acetophenone not produced in which reaction

(1) 

(2) 

(3) 

(4) 

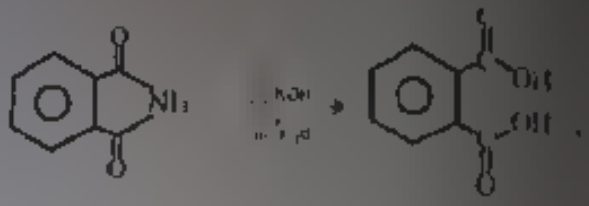
240. Which reaction shows decrease in number of carbon atoms in product

(1) Schmidt reaction

(2) Curtius reaction

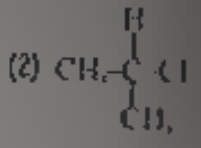
(3) Hoffmann's reaction

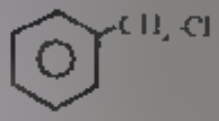
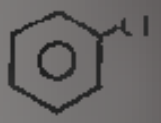
(4) All of these

241 

Primary amine

Z may not be

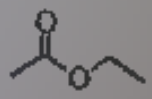
(1) C_6H_5Cl (2) 

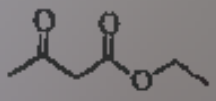
(3)  (4) 

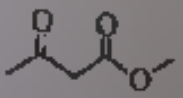
242 A $\xrightarrow{H_2O}$ B + EtOH

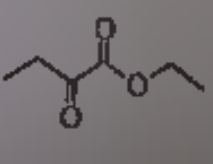
B $\xrightarrow{\Delta}$ Acetone

A is

(1) 

(2) 

(3) 

(4) 

243. $CH_3-C\equiv N \xrightarrow[H_2O]{SnCl_2+HCl}$ Product

Reaction is called

(1) Stephen reaction for preparation of amine

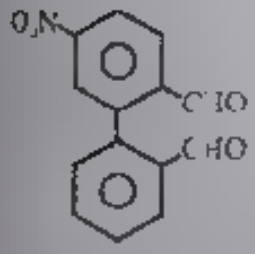
(2) Stephen reaction for preparation of imine

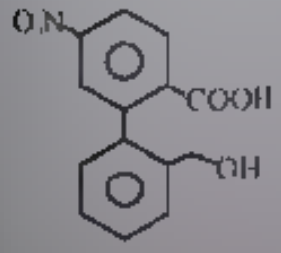
(3) Stephen reaction for preparation of ketone

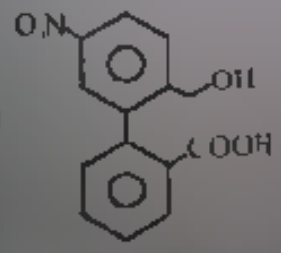
(4) Stephen reaction for preparation of aldehyde

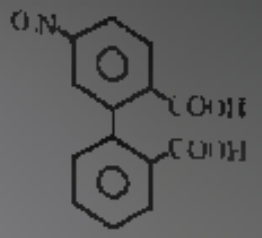
244. Correct statement for nucleophilic addition of sodium bisulphate on carbonyl compounds is
(1) This addition is highly sensitive to crowding steric crowding increases then addition decreases, so aldehyde more reactive than ketone in this reaction
(2) This reaction used for separation of aldehyde and ketone from a mixture containing some other compounds because addition product is a crystaline salt
(3) It is reversible reaction so bisulphite addition product regenerate corresponding carbonyl compound on treatment with acid or base
(4) All of these

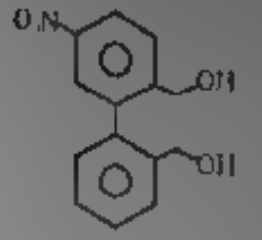
245. Which of the following does not react with (I_2 + NaOH) or NaOI :
(1) CH_3–CHO
(2) CH_3-CH_2-CHO
(3) CH_3 CH_2-O I
(4) CH C CH

246.  $\xrightarrow{\text{OH}}$ Product

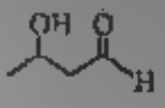
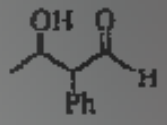
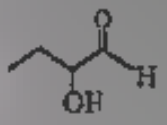
(1) 

(2) 

(3) 

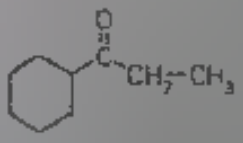
(4) 

247. Correct order of dehydration of aldol

( ) 
(I) 
(I) 

(1) II > > I
(2) > I > I I
(3) II > I > ,
(4) I > ,I > ,

248. Which of the following compound can form hydrazone and will give iodoform test but will not give Tollen's test?

(1) 

(2) H C C CH_2—CH_3
O

(3) H_3C–C–CH_2 CHO
O

(4) CH_3 CH_2 OH

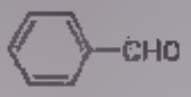
249. Propanal on treatment with dilute sodium hydroxide forms
(1) $CH_3CH\,CH_2CH_2CH_2CHO$
(2) $CH_3CH_2CH(OH)CH_2CH_2CHO$
(3) $CH_3CH_2CH(OH)CH(CH_3)CHO$
(4) $CH_3CH\,COONa$

250. Which of the following reactions will not result in the formation of carbon-carbon bond
(1) Friedel Crafts alkylation
(2) Reimer Tiemann reaction
(3) Cannizzaro reaction
(4) Wurtz reaction

251 Which of the following is most reactive towards nucleophilic attack at carbonyl group
(1) CH_3COCl (2) CH_3COOCH_3
(3) CH_3CONH_2 (4) $CH_3COOCOCH_3$

252. $CH_3CH_2COOH \xrightarrow{SOCl_2} A \xrightarrow[\Delta]{NH_3} B \xrightarrow[KOH]{Br_2} C$
Structure of compound C is
(1) $CH_3CH_2CH_2NH_2$ (2) $CH_3CH_2NH_2$
(3) $CH_3CH_2NHCH_3$ (4) $CH_3CH_2CONH_2$

253 Acetaldehyde and benzaldehyde can not be distinguished by
(1) Tollen's reagent (2) Fehling solution
(3) Benedict solution (4) Iodoform test

254 Which of the following compound does not give positive Fehling's test
(1) CH_3CHO (2) 
(3) $H_3C-\overset{\overset{O}{\|}}{C}-CH_3$ (4) 2 & 3 both

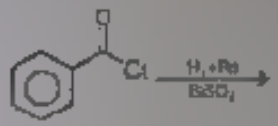
255 $RCH_2OH \xrightarrow{[O]} RCHO$
Which of the following oxidising agent is most suitable for above reaction?
(1) PCC (2) $K_2Cr_2O_7$
(3) $KMnO_4$ (4) All

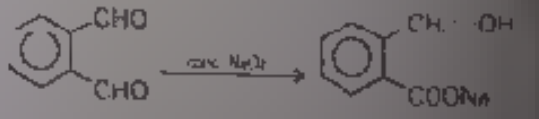
256 $CH_3-C\equiv CH \xrightarrow[HgSO_4]{dil.\ H_2SO_4} X \xrightarrow{Ba(NH_2)_2} Y$, Y is
(1) $CH_3-CH_2-CH=CH-\overset{\overset{O}{\|}}{C}-CH_3$
(2) $CH_3-\overset{CH_3}{\overset{|}{C}}=CH-\overset{\overset{O}{\|}}{C}-CH_3$
(3) $CH_3-\overset{CH_3}{\overset{|}{C}}=CH-CH_2-CH=O$
(4) $CH_3-CH_2-CH=CH-CH_2-CH=O$

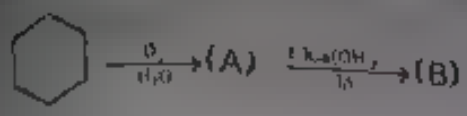
257 Which of the following is correct for
(1) $CH_3-COCl > CH_3-COOCO-CH_3 > CH_3-COC_2H_5 > CH_3-CONH_2$
(reactivity towards hydrolysis)
(2) $C_6H_5-CH=O > CH_3-CH=O > CH_3-CO-CH_3$
(reactivity towards cyanohydrine formation)
(3) 
(reactivity towards electrophilic substitution reaction)
(4) $CH_3-CH_2-CH(CH_3)-CH(CH_3)-OH >$

(reactivity towards Lucas reagent)

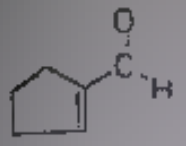
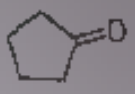
258. Benzaldehyde and acetaldehyde can be distinguish by
(1) Hinsberg reagent (2) Tollen's reagent
(3) Baeyer's reagent (4) Iodoform test

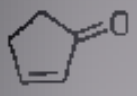
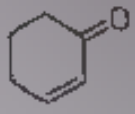
259. 
The above reaction is known as
(1) Etard reaction
(2) Rosenmund's reduction
(3) Friedel craft reaction
(4) Clemmensen's reduction

260 Which of the following reaction is not correct according to major product
(1) 
(2) $H_3C-CH_2-\underset{F}{CH}-CH_3 \xrightarrow{Alc.\ KOH} CH_3-CH=CH-CH_3$
(3) 
(4) $CCl_3-\overset{\overset{O}{\|}}{C}-H \xrightarrow{NaOH} CHCl_3 + HCOONa$

261  (A) (B)

Product B is

(1)  (2) 

(3)  (4) 

262 In which reaction racemic mixture is obtained as product?

(1) Ph-CHO+HCN →

(2) $H_3C-\underset{C_2H_5}{\underset{|}{CH}}-CH_2-OH+SOCl_2 \xrightarrow{\text{pyridine}}$

(3) $H_3C-\underset{Cl}{\underset{|}{CH}}-CH_2-CH_3+C_2H_5\overset{\ominus}{O}\overset{\oplus}{Na} \xrightarrow{\text{ROH}}$

(4) All of these

263. Arrange the following in order of their reactivity towards CH_3MgBr?

(I) $CCl_3-\overset{O}{\overset{\|}{C}}-H$ (II) $H_3C-\overset{O}{\overset{\|}{C}}-CH_3$

(III) $H_3C-\overset{O}{\overset{\|}{C}}-H$ (IV) $Ph-\overset{O}{\overset{\|}{C}}-CH_3$

(1) I > IV > II > III

(2) II > I > III > IV

(3) I > II > III > IV

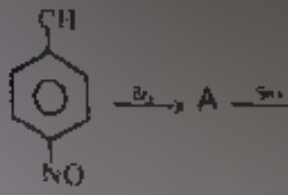
(4) I > III > II > IV

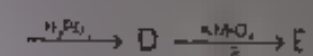
264 $\overset{CHO}{\underset{CHO}{|}}$ $\xrightarrow{NaOH}$ major product

(1) $\overset{CH_2OH}{\underset{CH_2OH}{|}}$ (2) $\overset{COONa}{\underset{COONa}{|}}$

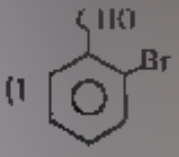
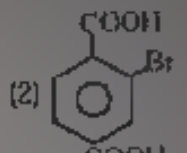
(3) $\overset{CH_2OH}{\underset{COONa}{|}}$ (4) $\overset{CH_2OH}{\underset{CHO}{|}}$

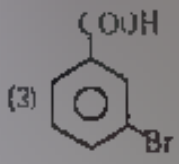
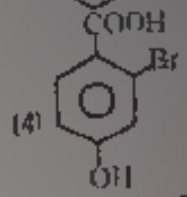
NITROGEN CONTAINING COMPOUND

265  A B C

 D E

End product E will be

(1)  (2) 

(3)  (4) 

266. Which is sendmeyer reaction in the followings

(1) $C_6H_5N_2Cl \xrightarrow{HBF_4} C_6H_5F$

(2) $C_6H_5N_2Cl \xrightarrow{Cu/HCl} C_6H_5Cl$

(3) $C_6H_5N_2Cl \xrightarrow{Cu_2Cl_2/HCl} C_6H_5Cl$

(4) $C_6H_5N_2Cl \xrightarrow{C_6H_5OH/NaOH} C_6H_5C$

267 Arrange the following is decreasing order of boiling point :

(I) $CH_3CH_2CH_2OH$

(II) $CH_3CH_2CH_2NH_2$

(III) $CH_3-\underset{CH_3}{\underset{|}{N}}-CH_3$

(IV) $CH_3CH_2NH-CH_3$

(V) $CH_3CH_2CH_2CH_3$

(1) I > II > IV > III > V

(2) II > IV > I > I > V

(3) > V > I > I > V

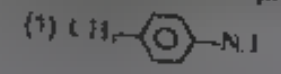
(4) II > > I I > IV > V

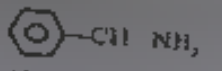
268 An compound react with Hinsberg's reagent gives a product which is soluble in alkali solution (NaOH solution) compound is

1) $C_6H_5NH_2$ 2) $C_2H_5NHC_2H_5$

3) $C_6H_5NHC_2H_5$ 4) $C_2H_5-\underset{\underset{H}{|}}{N}-C_2H_5$

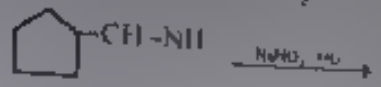
269 Which of the following compound cannot be formed by Gabriel phthalimide synthesis

(1) 

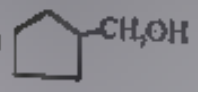
(2) 

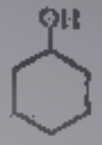
(3) $(CH_3)_2CH-NH_2$

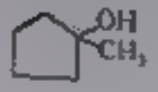
(4) $(C_6H_5)(CH_3)CH\cdot NH_2$

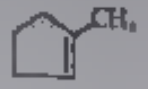
270 

Find out major product .

(1) 

(2) 

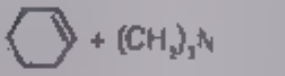
(3) 

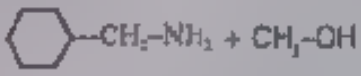
(4) 

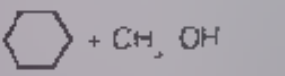
271 

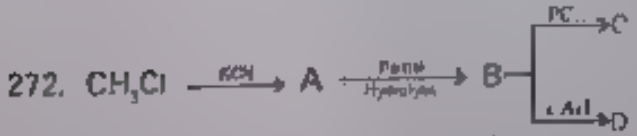
Product (C) and (D) will be .

(1) 

(2) 

(3) 

(4) 

272. 

Products C and D are respectively

(1) CH_3COCl and CH_3CH_2OH

(2) CH_3COCl and $CH_3CH_2NH_2$

(3) CH_3CN and $CH_3CH_2NH_2$

(4) CH_3CH_2Cl and CH_3CH_2OH

273 Which of the following conversion is incorrect .

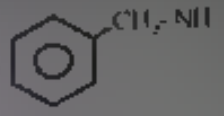
(1) $CH_3CN \xrightarrow{Na/C_2H_5OH \text{ or } LiAlH_4} CH_3CH_2NH_2$

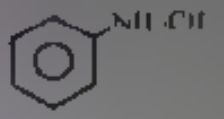
(2) $CH_3CONH_2 \xrightarrow{Br_2/KOH} CH_3CH_2NH_2$

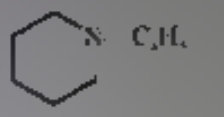
(3) $CH_3CONH_2 \xrightarrow{NaNO_2+HCl} CH_3COOH$

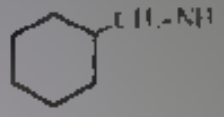
(4) $CH_3CONH_2 \xrightarrow{P_2O_5} CH_3CN$

274 Which of the following compound gives yellow oily liquid nitrosamine when react with nitrous acid

(1) 

(2) 

(3) 

(4) 

275. Aniline can be obtained by

(a) $C_6H_5COOH \xrightarrow{NH_3}$

(b) $C_6H_5CONH_2 \xrightarrow{Br_2, KOH}$

(c) $C_6H_5COOH \xrightarrow[\Delta]{NH_3}$

(d) $C_6H_5NO_2 \xrightarrow{Fe+H_2O}$

(1) a, b, c (2) a, b

(3) a, b, d (4) a, b, c, d

276. Aniline cannot be obtained by :

(1) $C_6H_5NO_2 \xrightarrow[\text{Electrolysis}]{\text{Conc. } H_2SO_4}$

(2) $C_6H_5Cl \xrightarrow[\Delta]{NaNH_2}$

(3) $C_6H_5COCl \xrightarrow{NaN_3}$

(4) $C_6H_5OH \xrightarrow[Dry\ ZnCl_2]{NH_3}$

277. Aniline can be prepared by

(1) $C_6H_5NO_2 \xrightarrow{Sn/\ NaOH}$

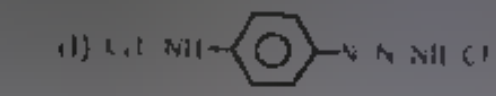
(2) $C_6H_5NO_2 \xrightarrow[\text{Electrolysis}]{\text{Fe/ Sn/}}$

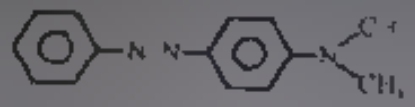
(3) $C_6H_5NO \xrightarrow{Alkaline\ medium}$

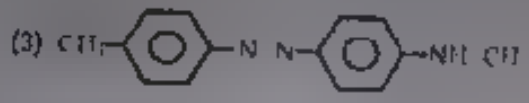
(4) $C_6H_5NO_2 \xrightarrow{Zn\ dust/\ H_2O}$

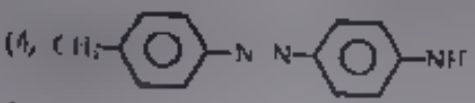
283 Aniline $\xrightarrow[0°C]{NaNO_2+HCl} X \xrightarrow{\text{H-acid}} Y$ (a coloured product)

The structure of Y would be

(1) 

(2) 

(3) 

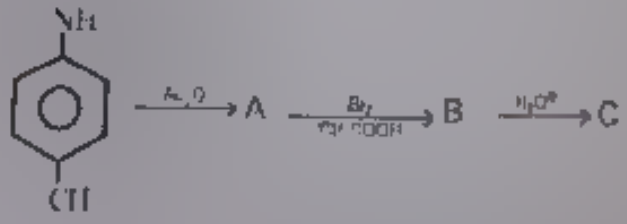
(4) 

284. Ethylamine on heating with CS_2 in presence of $HgCl_2$ forms

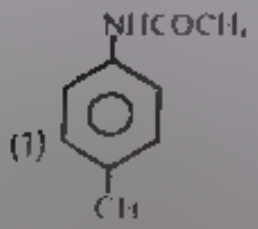
(1) C_2H_5CNS
(2) C_2H_5NCS
(3) C_2H_5CNO
(4) C_2H_5SH

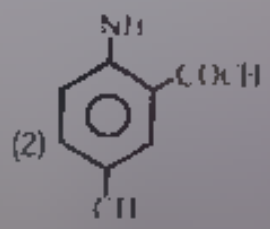
285. Leakage of which gas was responsible for the Bhopal gas tragedy in 1984

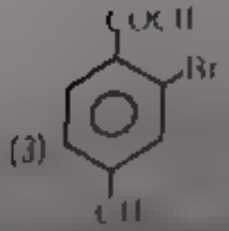
(1) CH_3NCO
(2) CH_3NCS
(3) CH_3CNO
(4) CH_3CNS

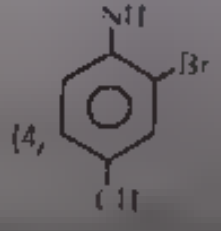
286 

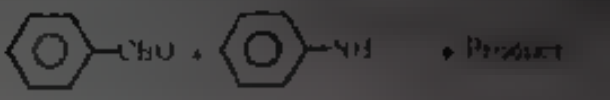
would be

(1) 

(2) 

(3) 

(4) 

287 

Product A is called

(1) Azo dye (2) Schiff reagent
(3) Schiff base (4) Glystal (a polymer)

288 Benzoylation reaction of NH group is known as

(1) Baiz Schotmanns reaction
(2) Schotten Baumanns reaction
(3) Gabriel phthalimide reaction
(4) Friedel craft reaction

289 Aryl fluoride may be prepared from arene diazonium chloride using

(1) CuF/HF (2) CuI/HF
(3) HBF_4/Δ (4) $HBF_4/NaNO_2$, Cu

290 On heating an aliphatic primary amine with chloroform and ethanolic KOH the organic compound formed is

(1) an alkyl cyanide (2) an alkyl isocyanide
(3) an alkanol (4) an alkanediol

291 $H_3C-\overset{O}{\overset{\|}{C}}-NH_2 \xrightarrow{PCl_5} A \xrightarrow[\text{dry ether}]{LiAlH_4} B$

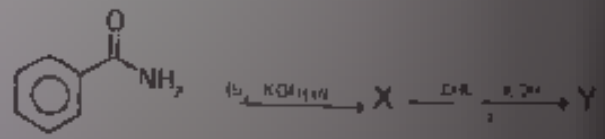
Final product B is

(1) A primary alcohol (2) A primary amine
(3) A secondary amine (4) A carboxylic acid

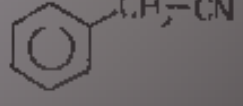
292. Which of the following compound gives a product with foul smell when reacted with chloroform in presence of a alkali?

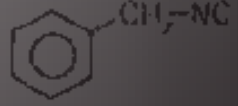
(1) $(CH_3)_2NH$ (2) CH_3NH_2

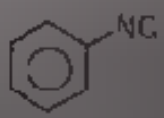
(3) $H_3C-\overset{O}{\overset{\|}{C}}-NH_2$ (4) $H_3C-\underset{CH_3}{\overset{|}{N}}-CH_3$

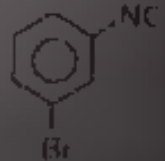
293 

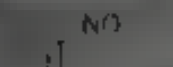
Y is

(1) 

(2) 

(3) 

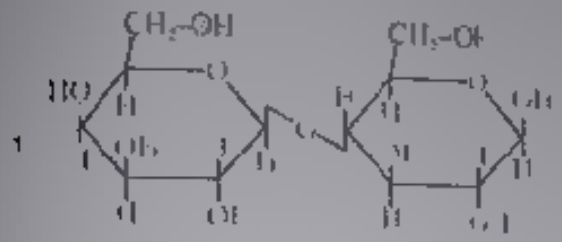
(4) 

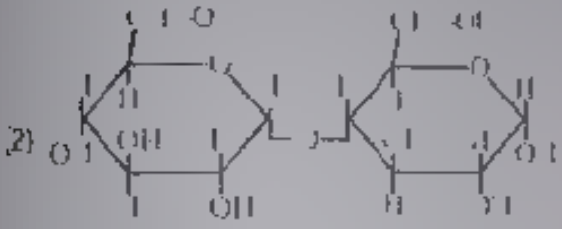
294.  + Products

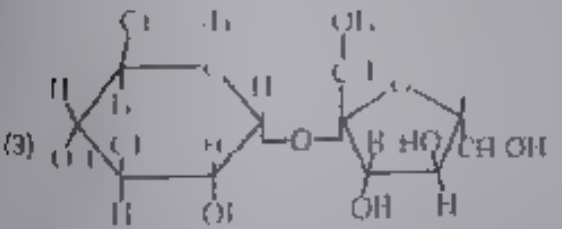
(1) Phenyl hydroxylamine
(2) p-amino phenol
(3) azoxybenzene
(4) aniline

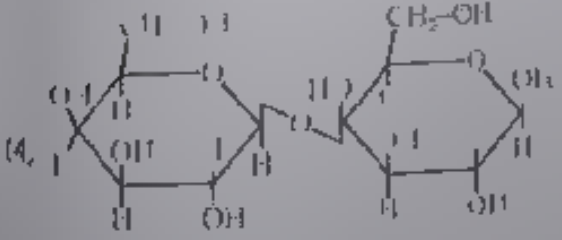
BIOMOLECULE, POLYMERS AND EVERYDAY LIFE

295. In disaccharide If the reducing group of monosaccharide aldehyde or ketonic groups are bonded, these are non-reducing sugars Which of the fnollowing disaccharide is a non-reducing sugars ?

(1) 

(2) 

(3) 

(4) 

296 Lysine, $H_2N-(CH_2)_4-CH(NH_2)-COOH$ is

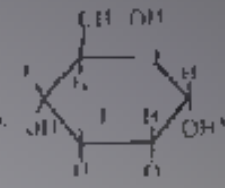
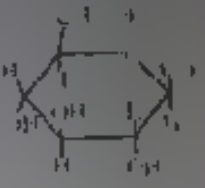
(a) α amino acid
(b) Basic amino acid
(c) Amino acid synthesis body
(d) β-Amino acid

(1) a, b, c (2) b, c
(3) b, d (4) a, b

297 Which of the following reaction of glucose can be explained only by its cyclic structure

(1) Glucose forms pentaacetate
(2) Glucose reacts with hydroxylamine to form an oxime
(3) Pentacetate of glucose does not react with hydroxy amine
(4) Glucose is oxidised by Bromine water to gluconic acid

298 Relation between (A) and (B) is

(A)  (B) 

(1) Epimers (2) Anomers
(3) Positional isomers (4) Functional isomers

299. $(CH\,OH)_4 \xrightarrow{HIO_4}$ Product
CH_2OH

(1) 5 HCHO +HCOOH
(2) 5 HCOOH + HCHO
(3) CH_3COOH + 5HCHO
(4) $5CH_3CHO$ + HCHO

300. Which is not correct match ?

Polymer	*Monomers*
(1) Orlon	Acrylonitrile
(2) Nylon-6,6 diamine	Hexamethylene and adipic acid
(3) Dacron	Ethylene glycol and terephthalic acid
(4) Caprolactum	Nylon-6, 10

301 Buna-S is a polymer of

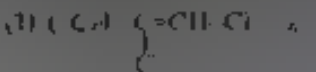
(1) Butadiene only
(2) Buta-1, 3-diene and styrene
(3) Styrene only
(4) Butadiene and acrylonitrile

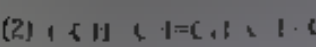
302. Which one of the following is not a polyamide polymers ?

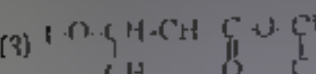
(a) Nylon-6,6 (b) Nylon-6,10
(c) Glyptal (d) Dacrone

(1) a, b (2) c, d
(3) a, c (4) a, b, c

303 Which of the following polymer is biodegradable?

(1) 

(2) 

(3) 

(4) 

304 Which of the following show mutarotation

(a) Glucose (b) Sucrose
(c) Maltose (d) Galactose
(1) a, b, c (2) b, c
(3) a, c, d (4) b, d

305. Glucose and mannose are
(1) Anomers (2) Position isomers
(3) Functional isomers (4) Epimers

306 Invert sugar is
(1) Sucrose (2) Fructose
(3) Glucose (4) Galactose

307 Glucose and fructose form identical osazones because ,
(1) they are monosaccharide
(2) they are reducing sugar
(3) they are epimer
(4) their configuration differ only at C-1 and C-2

308 In purine nucleoside, C-1 of sugar form glycosidic linkage with which position of purine
(1) 1 (2) 2 (3) 9 (4) 8

309 Which of the following is sulphur containing amino acid :
(a) Methionine (b) Cysteine
(c) Leucine (d) Glutamic acid
(1) a, b, c (2) a, b
(3) b, c (4) c, d

310 A metal present in vitamin B 12 is
(1) Aluminium (2) Zinc
(3) Iron (4) Cobalt

311. Correct statement for Bakelite is
(a) It is formed by phenol and formaldehyde
(b) It is cross-linked polymer
(c) It is thermosetting plastic
(d) It is natural polymer
(1) a, d (2) a, b, c (3) a, b, d (4) c, b

312 Which of the following polymers can have strong intermolecular forces
(a) Nylon (b) Dacron
(c) Rubber (d) Polyester
(1) a, b (2) a, d
(3) a, b, d (4) b, c, d

313 Match the column

Polymer		Commercial name	
(i)	Polyester of glycol and phthalic acid	(a)	Novolac
(ii)	Copolymer of 1-butadiene and styrene	(b)	Glyptal
(iii)	Phenol and formaldehyde resin	(c)	Buna-S
(iv)	Polyester of glycol and terephthalic acid	(d)	Buna-N
(v)	Copolymer of 1,3-butadiene and acrylonitrile	(e)	Dacron

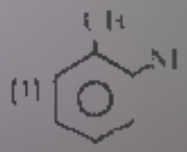
(1) i-b, ii-c, iii-e, iv-a, v-d
(2) i-b, ii-c, iii-a, iv-e, v-d
(3) i-e, ii-c, iii-a, iv-b, v-d
(4) i-e, ii-c, iii-b, iv-a, v-d

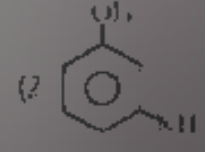
314. Match the column

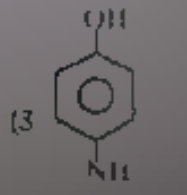
Polymer		Linkage	
(i)	Protein	(a)	Glycosidic linkage
(ii)	Cellulose	(b)	Ester linkage
(iii)	Protein	(c)	Phosphodiester linkage
(iv)	RNA	(d)	Amide linkage

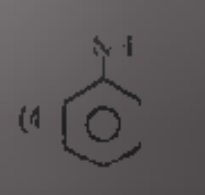
(1) i-b, ii-a, iii-c, iv-d
(2) i-b, ii-a, iii-d, iv-c
(3) i-d, ii-b, iii-a, iv-c
(4) i-a, ii-b, iii-d, iv-c

315 Which of the following gives paracetamol on acetylation

(1) 

(2) 

(3) 

(4) 

316 Aspirin is chemically
(1) Methyl benzoate
(2) Ethyl salicylate
(3) Acetyl salicylic acid
(4) o-hydroxy benzoic acid

317 Artificial sweetner which is stable under cold conditions only is
(1) Saccharine (2) Sucrolose
(3) Aspartame (4) Alitame

318 Which of the following is food preservatives
(a) Salt of sorbic acid
(b) Sodium benzoate
(c) Ethyl benzoate
(d) Alcohol
(1) a, b, d (2) a, b, c
(3) c, d (4) a, d

319 Which of the following statements are correct about barbiturates
(a) Hypnotics or sleep producing agents
(b) These are tranquilizers
(c) Non-narcotic analgesics
(d) Pain reducing without disturbing the nervous system
(1) a, b (2) a, b, c
(3) b, c (4) c, d

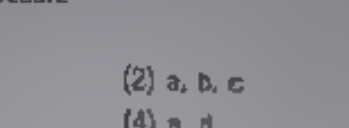
320 Which of the following compounds are administered as antacids ?
(a) Sodium carbonate
(b) Sodium hydrogen carbonate
(c) Aluminium carbonate
(d) Magnesium hydroxide
(1) a, b (2) b, d (3) a, b, c (4) c, d

321. Amongst the following antihistamines which are antacids ?
(a) Ranitidine (b) Cimetidine
(c) Asprine (d) Paracetamol
(1) a, b (2) a, b, c (3) b, c (4) c, d

322 Veronal and luminal are derivatives at barbituric acid which are
(a) Tranquilizers
(b) Non narcotic analgesic
(c) Antiallergic drugs
(d) Neurologically active drugs
(1) a, d (2) a, b (3) a, c (4) b, c

323 Bithionol is generally added to soaps as an additive to function as an
(1) Dryer (2) Antiseptic
(3) Softner (4) Antibiotic

324 Match the column

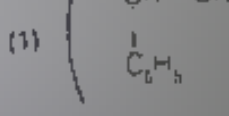
	Column-I Structure	Column-II Type of detergents
	$CH_3(CH_2)_{10}CH_2OSO_3^{\oplus}Na^{\oplus}$	(a) Cationic detergent
	$C_{17}H_{35}COO^{\ominus}Na^{\oplus}$	(b) Soaps
(c)	$CH_3(CH_2)_{15}N^{\oplus}(CH_3)_3Br^{\ominus}$	(c) Anionic detergent
(d)		(d) Soap

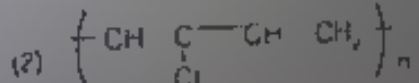
(1) (a), (b) – (c), (d)
(2) (a), (b) – (d), (c)
(3) (c), (d), (a), (b)
(4) (c), (d), (a), (b)

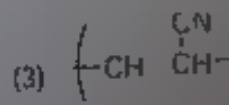
325. The species which can best serve as an initiator for the cationic polymerisation is
(1) HNO_3 (2) $AlCl_3$ (3) $BuLi$ (4) $LiAlH_4$

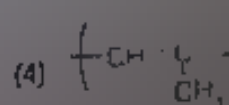
326 Which artificial sweetner contains chlorine ?
(1) Aspartame (2) Saccharin
(3) Sucralose (4) Alitame

327 Which of the following structures represents Neoprene polymer

(1) 

(2) 

(3) 

(4) 

328. Which of the following hormones contains iodine?
(1) Thyroxine (2) Insulin
(3) Testosterone (4) Adrenaline

329. α-D (+)glucose and β-D(+)glucose are
(1) position isomers (2) anomers
(3) enantiomers (4) conformers

330. Glucose does not give positive test with
(1) 2,4 DNP (2) Tollen's reagent
(3) Fehling's solution (4) All

331. Which of the following pair does not show correct relationship?
(1) Isoprene - Natural rubber
(2) Nylon - Polyamide
(3) Nylon-6 - Adipic acid
(4) Ziggler Natta catalyst : $TiCl_4 + (C_2H_5)_3Al$

332. Incorrect match is
(1) Nylon-6 : Caprolactum
(2) Buna-N - Elastomer
(3) Alitame - Artificial sweetner
(4) Antihistamine - Ranitidine

333. Correct statement for α-D-glucose is
(1) Can show mutarotation
(2) Do not give 2,4-DNP test
(3) Show reducing property with Tollen's reagent
(4) All of these

334. Which of the following is not correctly matched
(1) Nylon-6 — polyamide
(2) Buna-S — Co polymer
(3) Bakelite — Thermoplastic
(4) Polythene — Addition polymer

335. Which of the following is not correctly matched
(1) Antacid-Ranitidine
(2) Sucrose-Reducing sugar
(3) Antihistamine-Saldane
(4) Lactose-Milk sugar

336. Which of the following is not a monosaccharides?
(1) Glucose (2) Fructose
(3) Cellulose (4) D-Ribose

ENVIRONMENTAL CHEMISTRY AND QUALITATIVE AND QUANTITATIVE ANALYSIS

337. Which of the following is biodegradable pollutant?
(1) Nuclear waste (2) DDT
(3) Vegetable matter (4) Plastic

338. The region of atmosphere where human being live ?
(1) Troposphere (2) Stratosphere
(3) Biosphere (4) Exosphere

339. Stratosphere contains
(1) N (2) O
(3) O (4) All of these

340. Ozone is a toxic gas, yet its presence is essential in the atmosphere because
(1) It protects from harmful UV radiation
(2) It protects from infrared radiation
(3) It maintains temperature of earth to optimum level
(4) It reduces poisnous gases to non-poisnous gases

341. Which of the following is not categorised as particulate pollutant ?
(1) Dust (2) Smoke
(3) Smog (4) Carbon dioxide

342. What is DDT among the following?
(1) Non-biodegradable pollutant
(2) Green house gas
(3) A fertilizer
(4) Biodegradable pollutant

343. Major contributor of global warming is
(1) Carbon dioxide
(2) Carbon monooxide
(3) Methane
(4) Chlorofluoro carbon

344. Which of the following is not a green house gas ?
(1) CH_4 (2) O_2
(3) CO (4) H_2O vapour

345. BOD value less than 5 ppm indicates as water sample to be .
(1) rich in dissolved oxygen
(2) poor in dissolved oxygen
(3) highly polluted
(4) not suitable for aquatic life

346. Acid rain is due to increase in atmospheric concentration of
(1) Ozone and dust (2) CO and CO
(3) SO and CO (4) SO and NO

347. Ozone in the stratosphere depleted by
(1) C_2H_6 (2) CF Cl
(3) $C_6H_6Cl_6$ (4) C_2F_4

348. Taj Mahal is threatened by pollution from ?
(1) Sulphur dioxide (2) Hydorgen sulphide
(3) Chlorine (4) Carbon dioxide

349. Eutrophication causes reduction in :
(1) Dissolved hydrogen
(2) Dissolved oxygen
(3) Dissolved salts
(4) All of these

350. If BOD value of water is 20 ppm then what can we conclude regarding water ?
(1) Polluted water
(2) Less polluted water
(3) Pure water
(4) Highly polluted water

351. Which one of the following is not a common component of photochemical smog ?
(1) O_3 (2) $CH_2=CH-CHO$ Acrolein
(3) $CH_3-\underset{\underset{O}{\|}}{C}-O-O-NO_2$ Peroxyacetyl nitrate (PAN) (4) CFC

352. Which of the following statement is false for classical smog ?
(1) It occurs in cool, humid climate
(2) It is composed of smoke, fog and SO_2
(3) It is reducing in nature
(4) It is oxidising in nature

353. What is range of pH of acid rain ?
(1) More than 5.6 (2) In between 6 to 7
(3) Less than 5.6 (4) In between 6.5 to 7.5

354. Which of the following statements is wrong ?
(1) Ozone can oxidise sulphur dioxide present in the atmosphere to sulphur trioxide
(2) Chloro fluoro carbon are suppose to main cause of ozone layer depletion
(3) Ozone is produced in upper stratosphere by action of UV rays
(4) Ozone is not responsible for green house effect

355. Which of the following condition show polluted environment ?
(1) Eutrophication
(2) BOD is 4 ppm
(3) pH of rain water is 5.6
(4) Amount of CO_2 in the atmosphere is 0.03%

356. The prescribed upper limit concentration of lead in drinking water is about :
(1) 30 ppb (2) 70 ppb
(3) 50 ppb (4) 90 ppb

357. The consequence of global warming may be :
(1) Increase in average temperature of earth
(2) Melting of himalyan glaciers
(3) Increased BOD
(4) Both (1) and (2)

358. Which of the following statements about photochemical smog is wrong ?
(1) Photochemical smog is formed through photochemical reaction involving solar energy
(2) Plantation of some plants like pinus helps in controlling photochemical smog
(3) Photochemical smog has high concentration of oxidising agent
(4) Photochemical smog does not cause irritation to throat and eyes

359. Which of the following block delivery of oxygen to organs and tissues ?
(1) CO (2) CO_2 (3) SO_2 (4) O_3

360. Blue baby syndrome is cause by excess of :
(1) $F^{\ominus}$ (2) $NO_3^{\ominus}$
(3) Pb (4) SO_4^{2-}

361. Green chemistry deals with study of ?
(1) Plant physiology
(2) Reactions involved in synthesis of chlorophyll
(3) Synthesis of chemical compound using green light
(4) Such ways where existing principles of chemistry can beapplied in the production process with minimum pollution and deterioration of environment

362. Which of the following are primary precursors of photochemical smog ?
(1) CO_2 and PAN
(2) NO_2 and hydrocarbons
(3) O_3 and PAN
(4) NO_2 and PAN

363. Which of the following belong to secondary air pollutant ?
(1) CO
(2) Hydrocarbon
(3) Peroxyacetyl nitrate (PAN)
(4) NO

364. In Duma's method for estimation of nitrogen 0.4 gm of an organic compound gave 60 ml of nitrogen collected at 300 K temperature and 720 mm pressure. Calculate the percentage composition of nitrogen in the compound : (Aqueous tension at 300 K = 20 mm)
(1) 16.72% (2) 15.93%
(3) 15.72% (4) 7.46%

365. Carbon and hydrogen are estimated in organic compounds by :
(1) Kjeldahl's method (2) Duma's method
(3) Liebig's method (4) Carius method

366. Lassaigne's test for the detection of nitrogen will fail in case of :
(1) NH_2CONH_2
(2) $NH_2CONHNH_2.HCl$
(3) $NH_2NH_2.HCl$
(4) $C_6H_5NHNH_2.2HCl$

367. In a Lassaigne's test for sulphur in the organic compound with sodium nitroprusside solution the violet colour formed is due to :
(1) $Na_4[Fe(CN)_5NOS]$
(2) $Na_3[Fe(CN)_5S]$
(3) $Na_2[Fe(CN)_5NOS]$
(4) $Na_2[Fe(CN)_6]$

368. During Lassaigne's test, N and S present individually in an organic compound changes into :
(1) Na_2S and NaCN (2) NaSCN
(3) Na_2SO_4 and NaCN (4) Na_2S and NaCNO

369. The purpose of boiling sodium extract with conc. HNO_3 before testing for halogen is :
(1) to make solution acidic
(2) to make solution clear
(3) to convert Fe^{+2} to Fe^{+3}
(4) to convert NaCN to HCN and Na_2S to H_2S so that they do not interfere with $AgNO_3$

370. In Duma's method and Kjeldahl's method, respectively nitrogen present is estimated as :
(1) N_2, NH_3 (2) NH_3, N_2
(3) NO_2, NH_3 (4) N_2, N_2

371. The sodium extract of an organic compound on acidified with acetic acid and addition of lead acetate solution gives a black precipitate. The organic compound contains :
(1) Nitrogen (2) Halogen
(3) Sulphur (4) Phosphorous

372. When N and S both are present in an organic compound, the sodium extract with $FeCl_3$ gives :
(1) Green colour (2) Blue colour
(3) Yellow colour (4) Red colour

373. During Lasaigne's test nitrogen containing organic compound when fused with sodium metal forms 'X' while sulphur containing organic compound. When fused with sodium metal forms 'Y'. Then identify X and Y :
(1) X = NaCN ; Y = Na_2S
(2) X = NaNC, Y = Na_2S
(3) X = $NaNO_2$, Y = Na_2SO_4
(4) X = NaCN ; Y = Na_2SO_4

374. In Lassaigne's test, the organic compound is fused with sodium metal as to :
(1) Hydrolyse the compound
(2) Form a sodium derivative
(3) Burn the compound
(4) convert nitrogen, sulphur or halogen if present into soluble ionic sodium compound

375. Aniline is separated from aniline-water mixture by :
(1) Simple distillation
(2) Fractional distillation
(3) Steam distillation
(4) Distillation under reduced pressure

376. o-nitrophenol and p-nitrophenol are separated by :
(1) Steam distillation
(2) Simple distillation
(3) Fractional distillation
(4) Distillation under reduced pressure

377. Glycerol is separated form spent lye by :
(1) Steam distillation
(2) Vaccum distillation
(3) Sublimation
(4) Simple distillation

378. Two volatile and miscible liquids can be separated by fractional distillations into pure components under the condition when :
(1) They have low boiling points
(2) The difference in boiling point is large
(3) The boiling of two liquids are close to each other
(4) They do not form axeotropic mixture

379. A mixture contain four solid organic compound A, B, C and D. On heating only C changes from solid to vapour state directly. C can be separated from rest in the mixture by :
(1) Distillation
(2) Sublimation
(3) Fractional distillation
(4) Crystallisation

380. Simple distillation technique can be used to separate ?
(1) Chloroform and Aniline
(2) Ether and Toluene
(3) Hexane and Toluene
(4) All of these

381. Mixture of acetone and methyl alcohol can be separated by :
(1) Simple distillation (2) Fractional distillation
(3) Sublimation (4) Chromatography

382. In column chromatography, the moving phase is :
(1) The substances that are to be separate
(2) Solvent (Eluent)
(3) Adsorbent
(4) Mixture of eleuant and substance to be separated

383. The principle involved in paper chromatography is :
(1) Adsorption (2) Partition
(3) Solubility (4) Volatility

384. A mixture of naphthaline and benzoic acid can be separated by :
(1) Chromatrography
(2) Sublimation
(3) Fractional crystallisation
(4) Distillation

385. A sample of 0.5 g of an organic compound was analysed using Kjeldahl's method. The ammonia evolved was absorbed in 50 ml of 0.5 M H_2SO_4, the unused acid after neutralisation by ammonia consumed 80 ml of 0.5 NaOH. Then calculate percentage of nitrogen in organic compound :
(1) 28 (2) 42 (3) 56 (4) 26

386. In Kjeldahl's method used for estimation of nitrogen, ammonia evolved from 0.6 g of sample of organic compound neutralised 20 ml of 1 N H_2SO_4. Then calculate % of nitrogen in that compound :
(1) 37.33 (2) 46.67
(3) 45.77 (4) 43.33

387. In the estimation of sulphur by carius method 0.480 g of organic compound give 0.699 g of Barium sulphate. The percentage of sulphur in the compound is (Atomic masses : Ba = 137, S = 32, O =16)
(1) 15% (2) 35%
(3) 20% (4) 30%

388. 1.4 g of an organic compound was digested according to Kjeldahl's method and the ammonia evolved was absorbed in 60 mL of M/10 H_2SO_4 solution. The excess sulphuric acid requires 20 mL of M/10 NaOH solution for neutralisation. The percentage of nitrogen in the compound is
(1) 3 (2) 5 (3) 24 (4) 10

389. In Duma's method of estimation of nitrogen 0.35 g of an organic compound gave 55 ml of nitrogen collected at 300 K temp. and 715 mm pressure. The percentage of nitrogen in compound is (aqueous tension at 300 K = 16 mm)
(1) 15.45 (2) 16.45 (3) 17.45 (4) 14.45

ORGANIC CHEMISTRY

ANSWER KEY

Que.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Ans.	2	2	3	4	3	3	4	3	4	2	2	*3	3	2	1
Que.	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
Ans.	3	4	2	2	1	2	2	1	*3	3	3	4	3	4	4
Que.	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
Ans.	2,3	1	4	4	2	3	3	2	1	2	3	2	2	4	1
Que.	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
Ans.	2	2	4	2	2	2	3	1	2	2	3	2	3	3	3
Que.	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75
Ans.	2	3	3	3	4	2	4	2	2	3	2	4	3	3	2
Que.	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90
Ans.	3	4	3	3	3	2	2	1	3	3	2	2	3	1	1
Que.	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105
Ans.	1	2	3	2	*1	3	3	2	3	4	4	4	3	1	3
Que.	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120
Ans.	3	2	2	3	2	3	3	4	3	1	2	3	3	4	4
Que.	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135
Ans.	4	1	3	3	1	2	2	1	1	3	2	1	4	4	2
Que.	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150
Ans.	4	2	3	2	3	2	3	4	4	4	3	2	2	4	1
Que.	151	152	153	154	155	156	157	158	159	160	161	162	163	164	165
Ans.	2	4	2	2	1	4	1	4	3	3	3	3	4	4	4
Que.	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180
Ans.	4	1	2	3	3	3	2	3	2	4	4	3	1	3	4
Que.	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195
Ans.	2	2	3	3	2	3	4	3	1	4	3	2	1	2	4
Que.	196	197	198	199	200	201	202	203	204	205	206	207	208	209	210
Ans.	1	4	3	2	1	4	1	2	2	4	2	1	2	4	1
Que.	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225
Ans.	2	3	3	3	4	3	3	3	1	4	4	3	1	4	4
Que.	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240
Ans.	1	4	4	4	4	4	3	4	4	1	4	2	4	4	4
Que.	241	242	243	244	245	246	247	248	249	250	251	252	253	254	255
Ans.	4	2	4	4	2	1	1	2	3	3	1	2	1	4	1
Que.	256	257	258	259	260	261	262	263	264	265	266	267	268	269	270
Ans.	2	1	4	2	2	2	1	4	3	2	3	1	1	1	2
Que.	271	272	273	274	275	276	277	278	279	280	281	282	283	284	285
Ans.	2	3	2	2	2	1	2	4	4	2	3	2	2	2	1
Que.	286	287	288	289	290	291	292	293	294	295	296	297	298	299	300
Ans.	4	3	2	3	2	2	2	3	4	3	4	3	2	2	4
Que.	301	302	303	304	305	306	307	308	309	310	311	312	313	314	315
Ans.	2	2	3	3	4	1	4	3	2	4	2	3	2	2	3
Que.	316	317	318	319	320	321	322	323	324	325	326	327	328	329	330
Ans.	3	3	2	1	2	1	1	2	3	2	3	2	1	2	1
Que.	331	332	333	334	335	336	337	338	339	340	341	342	343	344	345
Ans.	3	4	4	3	2	3	3	1	4	1	4	1	1	*3	1
Que.	346	347	348	349	350	351	352	353	354	355	356	357	358	359	360
Ans.	4	2	1	2	4	4	4	3	4	1	3	4	4	1	2
Que.	361	362	363	364	365	366	367	368	369	370	371	372	373	374	375
Ans.	4	2	3	3	3	3	3	1	4	1	3	4	1	4	3
Que.	376	377	378	379	380	381	382	383	384	385	386	387	388	389	390
Ans.	1	2	3	2	4	2	4	2	1	1	2	3	4	2	